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ABSTRACT

The fourth of six monographs on postsecondary vocational technical programs for deaf students provides data on students' performances on the Stanford Achievement Test, General Aptitude Test Battery and the Nonreading Measure of General Intelligence, and the Weschler Adult Intelligence Scale. Ss consisted of 28 students from Delgado Junior College, 26 from Seattle Community College, and 30 from the Technical Vocational Institute. A description of tech test, its limitations and qualifications, and its methods and procedures is provided in addition to test data. Test results are discussed, and educational implications such as the following are drawn: that most deaf people achieve at levels far below what might be expected on the basis of their intellectual abilities; that the more a particular area is related to facility in the English language the greater is the gap between potential and performance for typical deaf students; and that it is unreasonable to expect vocational technical programs to provide deaf students with the English language skills they have not acquired in 12 years or more of prior schooling. (GW)

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POST-SECONDARY PROGRAMS FOR THE DEAF: IV. Empirical Data Analysis

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Research, Development and Demonstration
Center in Education of Handicapped Children
Minneapolis, Minnesota

December 1974

The research reported herein was performed pursuant to a grant from the Bureau of Education for the Handicapped, U.S. Office of Education, Department of Health, Education, and Welfare to the Center of Research, Development and Demonstration in Education of Handicapped Children, Department of Psychoeducational Studies, University of Minnesota. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official position of the Bureau of Education for the Handicapped.

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RESEARCH, DEVELOPMENT AND DEMONSTRATION CENTER IN EDUCATION OF HANDICAPPED CHILDREN

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The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

Acknowledgments

The authors would like to thank the following people at each program who were especially helpful during the research conducted in 1973: Linda Donnels, Peter Wuescher, Douglas Wells, Michael Weldon and Roy Pierce, Delgado Junior College; Stanley Traxler, Alice Burch, Lucy Fridell, William Davis and Steven King, Seattle Community College; Robert Lauritsen, Irene Domonkos, Roger Reddan and John Bachman, St. Paul Technical Vocational Institute; along with all the interpreters, preparatory program teachers, technical vocational teachers, counselors and current students at the various participating programs whose cooperation facilitated complete data collection.

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Labor for testing many of the students included in the project. In particular, appreciation is extended to Edward Schultz of the Minnesota office for his assistance in preparing General Aptitude Test Battery testing contracts in all three states.

We extend our appreciation to Dr. Ben Hoffmeyer, Headmaster of the American School for the Deaf for granting us free access to the American School's Historical Library and to Jane Wilson, American School librarian for her assistance.

Finally, this project could not have been undertaken without the cooperation of hundreds of parents, vocational rehabilitation counselors, young deaf people and employers. We hope in return this project will have made a contribution to them by bringing the current occupational status of young deaf people into focus and recommending courses of action designed to elevate their status and permit them to become even more productive members of society.

Foreword

The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children became involved in the evaluation of post-secondary programs in July 1972, several years after the three programs in consideration had been established. The charge to the Center was to develop, in cooperation with the programs in New Orleans, St. Paul, and Seattle, mechanisms by which to identify those components necessary for the development and maintenance of successful post-secondary vocational technical programs for hearing impaired students.

A special debt of gratitude is owed to the three programs for their willingness to cooperate with an "outside" evaluation team rather than follow the more traditional mode of self-evaluation. We hope that whatever inconvenience the programs may have experienced will be compensated for by the results of the evaluation.

The evaluation was made possible through the cooperation of two federal agencies, the Bureau of Education of the Handicapped (BEH) and Social and Rehabilitation Services (SRS). We gratefully acknowledge the support and advice of Max Mueller of BEH and Edna Adler and Deno Reed of SRS. Of primary importance, of course, has been the interest and support of Boyce Williams, Chief of the Department of Communication Disorders at SRS. The author was a very junior major investigator in 1964 on a project evaluating the economic status of young deaf adults in New England. That project was conducted through the initiation of Dr. Williams and he has continued to exert his leadership touching

many aspects of the lives of deaf individuals. It is safe to say that without his efforts the substantial gains made in vocational technical training for the deaf would have been of a more limited nature.

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INTRODUCTION

Background

The present paper represents the fourth of a series of six monographs produced as a result of an evaluation of three federally funded post-secondary vocational technical programs for deaf students. The programs are:

1) Delgado Community College, New Orleans, Louisiana;
2) Seattle Community College, Seattle, Washington;
3) Technical Vocational Institute, St. Paul, Minnesota.

Monograph I, Post-Secondary Programs for the Deaf: Introduction and Overview, contains a complete description of the three programs.

The study was designed with the following objectives:

(1) To provide developing post-secondary programs with guidelines for establishing programs for the deaf.

(2) To determine as precisely as possible the nature of the three demonstration projects in relation to:

a) Population served
b) Courses of study offered
c) Supportive services provided
d) Cost of services

(3) To determine the effectiveness of the type of post-secondary programming offered by the three demonstration projects in:

a) Course success
b) Employment success
cc) Attrition
d) Comparison of student and non-student success

(4) To consider student characteristics in an attempt to derive implications for specific instructional vocational procedures.

The objectives may be seen as encompassing two components. The first deals with the three existing federally funded demonstration

programs. Formative process evaluation was conducted as a means of increasing the effectiveness of ongoing programs. The final outcome of the project, based on the summative education of the demonstration programs, is concerned with establishing guidelines for new programs.

In addition to program descriptions, Monograph I contains a complete statement of the problem, review of the literature, and summary of previous investigations on the vocational status of the deaf. The series was developed to be read sequentially and the reader is advised to be familiar with the contents of Monograph I before reading the present report.

ORGANIZATION OF MONOGRAPH SERIES

Procedures are spelled out in detail in the appropriate sections. Including the present report, six monographs have been developed and comprise the total package. The monographs are as follows:

I Introduction and Overview
II External Views of Programs
III Internal Views of Programs
IV Empirical Data Analysis
V Followup Data Analysis
VI Guidelines

Monograph I: Introduction and Overview

This report is divided into the following categories:

1. Introduction and Statement of the Problem
2. Review of the Literature
3. Program Descriptions
4. Procedures

Monograph II: External Views of Programs.

Material in this monograph is based on results obtained by two sets of interviews and two sets of questionnaires as follows:

1. Interviews of Former Students Now Employed
2. Interviews of Employees' Supervisors
3. Parent Questionnaires
4. Vocational Rehabilitation Counselor Questionnaires

For each category the results are treated separately for each of the three programs (Delgado, Seattle, TVI) as well as on a general basis across programs. The same procedure was followed for all subsequent monographs.

Monograph III: Internal Views of Programs.

Material in this section is based on interviews with the following category of respondents:

1. Current Students
2. Deaf Program Staff
   a) Administrators
   b) Counselors
   c) Preparatory Program Teachers
   d) Interpreters
3. Technical Vocational Teachers-College training staff.

Monograph IV: Empirical Data Analysis.

Empirical data analysis was conducted on two groups, Former Students and Current Students:

1. Former Students
   a) Stanford Achievement Test
   b) General Aptitude Test Battery
   c) Non Reading Measure of General Intelligence
   d) Wechsler Adult Intelligence Scale

2. Current Studies
   a) Stanford Achievement Test
   b) General Aptitude Test Battery
   c) Non Reading Measure of General Intelligence
   d) Wechsler Adult Intelligence Scale

Monograph V: Follow-up Data Analysis

The follow-up data consist of information on former students arranged in the following categories:

1. Areas of Training
2. Former Student Status
   a) Graduates
   b) Goal Completions
   c) Withdrawals
3. Job Placement
4. Geographic Origin

Monograph VI: Guidelines and Summary

This monograph provides guidelines for the development and monitoring of effective vocational technical programs for the deaf within ongoing programs for hearing students. A summary of the complete study is also provided.

Presentation of empirical data analysis

Empirical data were gathered from student files on the following measures: The Stanford Achievement Test Intermediate Battery I and Intermediate Battery II, the General Aptitude Test Battery (GATB), the Non Reading Measure of General Intelligence (Non Reading "g"), and the Wechsler Adult Intelligence Performance Scale (WAIS). Pooled together, these achievement, aptitude, and intelligence data provide a profile of students admitted to the three post-secondary programs for the hearing impaired. In addition, these student characteristics provide information regarding student strengths and weaknesses from which ideas for instructional improvements can be derived.

GENERAL INFORMATION

Empirical Data Background

During the first three years of the federally-funded model post-secondary programs, a different research component than the present one participated as the programs' evaluator. The University of Minnesota Research, Development, and Demonstration Center in Education of Handicapped Children replaced the initial research component in the Fall of 1972, and acquired all previously collected data, most of which was received by the University of Minnesota in transcribed rather than original form. The data received was organized in an erratic and inconsistent form. The present research component was, therefore, faced with the problem of conducting an ad hoc evaluation on the basis of data whose validity and reliability were in question. Desiring to ameliorate this problem without eliminating previously collected data, the current research component established and implemented a data validation procedure as follows: (1) it gathered data on a representative sample of the student body which fit the same parameters as those in the earlier sample; (2) the test measures implemented were a subset of those administered previously; (3) the two sets of data were analyzed to generate student profiles; and (4) the profiles were analyzed for congruency.

To distinguish between previously collected data and data collected for purposes of validation, the information presented herein is organized into two distinct sets: the first set will be referred to as "former student data" and the second set "current student data."

Former Student Data. The former student data set, collected by the former research component and supplemented by additional information provided by the three programs, consists of achievement, aptitude and intelligence data from the following test measures:

1. The Standord Achievement Test
   Intermediate Batteries I and II

2. The General Aptitude Test Battery (GATB)

3. The Non Reading Measure of General Intelligence
   (Non Reading "g")

4. The Wechsler Adult Intelligence Scale (WAIS):
   Performance

According to the transferred data sheets, a total of 428 hearing impaired program students is represented in the sample (Delgado -- 129, Seattle -- 114, TVI -- 185). These students entered any one of the three model programs prior to the Spring 1972 school quarter or semester. The average age of these students is 21 years. There is test information on at least one of the above mentioned measures for each student in the sample. The total number of students on whom there are data, for each measure, is as follows:

1a. Stanford Intermediate Battery I - 137 students
1b. Stanford Intermediate Battery II - 141 students

2. GATB - 376 students

3. "g" - 297 students

4. WAIS - 304 students

Current Student Data. The current student data were collected for the purpose of validating profiles generated by the analysis of former student data. It consists of achievement, aptitude, and intelligence data from the following:

1. The Stanford Achievement Test Intermediate Battery II
2. The General Aptitude Test Battery (GATB)
3. The Non Reading Measure of General Intelligence
4. The Wechsler Adult Intelligence Scale (WAIS): Performance

In December of 1972, the current research component requested that each program administer the first four tests to every Spring 1972 through Spring 1973 program entry who had not previously been tested. The research team then made three data gathering trips, one to each of the three programs in January and February of 1973: TVI was visited January 29 to February 2; Delgado, February 5 to February 8; and Seattle, February 11 to February 15, 1973. To enhance uniform data collection, one researcher recorded GATB, Stanford, Non Reading "g" and WAIS data from student file originals and co-administered and scored the Stanford Achievement Test at Delgado.

Data were compiled on a total of 155 hearing impaired program students who entered one of the three model programs during the Spring 1972 through Spring 1973 school quarters or semesters. Of these, 84 students were selected as members of the research sample in the following manner. The 155 member sample was first grouped by school, then by sex within school. Those subjects for whom there were test data on two or less measures were eliminated from the selection process; and a random selection of members for the validation sample was made within sex groups to insure a representative sample of males and females within each school. The resulting sample consisted of 28 students (14 females, 14 males) enrolled in the Delgado program, 26 (11 females and 15 males)

from Seattle and 30 (15 females and 15 males) at TVI. By test measure, the total number of students on whom there are data is as follows:

1. Stanford Intermediate Battery II - 84 students
2. GATB - 84 students
3. Nonreading "g" - 62 students (see Table 9 for explanation)
4. WAIS - 82 students

Treatment of data - The nature of the data presented herein is quantitative. All test measure variables were coded and computerized for statistical analysis. The statistics include (1) computations of means and standard deviations, (2) Analysis of Variance and (3) Significance tests.

THE STANFORD ACHIEVEMENT TEST

The Stanford Achievement Test Intermediate Batteries I and II are comprehensive achievement tests constructed to measure an individual's knowledge of subject matter, skills, and understandings considered desirable outcomes of elementary education. (Kelley, T. L. Madden, R., Gardner, E. F. and Rudman, H. C., 1964) The Stanford was selected for inclusion in this study because it is the most frequently, nationally used achievement test in educational programs for the hearing impaired. The information presented herein will, therefore, permit a broader range of data comparisons than would less familiar test measures.

In addition, the Intermediate Batteries of the Stanford were employed because the test level appeared to be appropriate for the population tested. In 1965, the Babbidge report indicated that the median grade average of 341 18- and 19-year old hearing impaired students leaving public residential schools was 6.5; of the 20-year-olds leaving (N = 243), the median was 6.0, while those leaving at age 21 had a median grade average of 5.5 (N = 110). Battery I is designed for use from the beginning of grade 4 to the middle of grade 5 and Battery II from the middle of grade 5 to the end of grade 6. Both batteries are within the range of median grade scores reported by Babbidge. Since an exam is most effective for a sample of students when the test items are neither too difficult nor too easy for the group, it was appropriate that these battery levels be administered even though they were designed for use with students younger than those in this study.

A. Test Description

1. Intermediate Battery I -- The Stanford Achievement Test Intermediate Battery I is primarily designed for use with individuals from the beginning of grade 4 through the middle of grade 5. This battery consists of a 32 page booklet and includes ten subtests: Word Meaning, Paragraph Meaning, Spelling, Word Study Skills, Language, Arithmetic Computations, Arithmetic Concepts, Arithmetic Applications, Social Studies and Science. The nature and content of these subtests are as follows:

Word Meaning Test (WM) - This subtest measures reading skill, the acquisition of which is considered partly dependent upon word knowledge. The WM test consists of 38 multiple-choice items which measure knowledge of synonyms, simple definitions and ready associations. Words included in this test are selected on the basis of frequency of word occurrence and materials read by pupils at this level.

Paragraph Meaning Test (PM) - PM tests reading ability by assessing the student's comprehension of connected discourse. The test consists of a series of paragraphs graduated in difficulty. One or more words are omitted from each paragraph. The examinee must select, from four choices, the proper word for each omission. In addition, questions regarding paragraph content are asked in multiple-choice form.

Spelling (SP) - Spelling achievement is primarily measured by this subtest. SP consists of 50 multiple-choice items in which the incorrectly spelled word must be identified. Nearly all the words included are within the first 5000 words in children's usage.

Word Study Skills (WSS) - The word study skills tests consists of exercises in phonics and syllabication; there are 36 three-choice phonics questions and 25 four-choice questions relating to syllabication. The phonics part of the test measures one's ability to use phonic patterns in word recognition. The ability to see word structure is measured by syllabication. This test does not appear valid for hearing impaired students, since it depends on the student's familiarity with sounds.

Language Test (L) - The language test consists of five independent exercises: capitalization, dictionary skills, punctuation, usage and sentence sense. The test is constructed to test an individual's English language skills.

Arithmetic Computation (AC1) - This test measures one's proficiency in the fundamental computational operation of addition, subtraction, multiplication and division appropriate to grades 4 and 5.

Arithmetic Concepts (AC2) - AC2 measures one's understanding of operational terms, Roman numerals, estimation, average, decimal fraction positions, geometric terms, and other concepts related to the use of arithmetic principles.

Arithmetic Applications (AA) - The AA test consists of 33 multiple-choice questions which measure problem solving ability. One is required to apply his mathematical knowledge and ability to reason in practical situations. So that it is only a minor factor, computation difficulty has been controlled. In addition, the reading vocabulary has been kept much below the problem solving level.

Social Studies (SS) - The Social Studies test is in two parts -- Part A includes questions on history, geography and civics. Part B, the study skills test, measures the ability to make use of reference materials.

Science (SC) - The objectives of this test are (1) to measure the ability to see the application of principles of science in our environment; (2) to assess one's knowledge of facts and generalizations from the natural sciences; and (3) to test one's knowledge of the scientific method.

2. Intermediate Battery II -- The Stanford Achievement Test Intermediate Battery II is designed for use with pupils from the middle of grade 5 to the end of grade 6. It consists of nine subtests presented in a single 32 page booklet. These subtests are the same as those included in the Intermediate Battery I with the exception of the Word Study Skills Test which is omitted from Battery II. The purpose and nature of the subtests in both batteries are basically the same. The major difference between the two is that the content of the Intermediate Battery II is more advanced since it addresses itself to a school population at a higher grade level. Due to the similarity between subtests of these two batteries, detailed descriptions of this second group of subtests will not be presented here; please refer to the immediately preceding section for subtest delineation.

B. Test Limitations and Qualifications

It is important that the achievement data presented herein be viewed with an awareness that the Stanford Acheivement tests were developed and standardized for hearing students attending regular educational programs and not for hearing impiared individuals attending specially modified programs. When any test is used with a population other than that for which it was standardized, the validity and reliability of the test results may be questionable. The Annual Survey of Hearing Impaired Children and Youth (Series D, No. 9, 1972) mentions three test features which inherently limit accurate Stanford measurement with hearing impaired populations. These are (1) the test structure and format -- test directions are designed for oral dictation and the language level and structure of test questions may be biased against English language handicapped individuals, (2) the test content reflects the curriculum of regular schools for hearing students which may vary in content and emphasis from what is taught in special educational programs for the hearing impaired and (3) standardization and uniformity of testing procedures with the hearing impaired have not been thoroughly explored. This research group warns that Stanford data should not be used to compare hearing and hearing impaired student levels of achievement, nor should these data be used to develop national norms for hearing impaired students. Taking these qualifications and limitations into account, the authors of the current monograph will examine the Stanford Achievement Test results of hearing impaired students in order to assess the pupils' relative strengths and weaknesses according to their performance on achievement subtest

categories. In other words, attention will be focused on the achievement profile of the hearing impaired individuals in our sample.

C. Methods and Procedures

The Stanford Achievement Test was administered to all students upon admission into one of the three programs for the hearing impaired. The examiner at each program was usually a preparatory program teacher who was proficient in the use of Total Communication (i.e., a form of communication employing the simultaneous use of sign language, fingerspelling, speech and speech reading, and body language). All of the test instructions were communicated to the hearing impaired students via Total Communication. At both Seattle Community College and the Technical Vocational Institute a hearing impaired preparatory program instructor administered and scored the exams. At Delgado the tests were scored by either the research department of the Junior College or the English preparatory instructor. Following test administration and scoring, exam results were compiled by each of the programs and sent to the research component for analysis. Most of the current student data were recorded from student file originals by the research team.

1. Former Student Stanford Data. During preliminary analysis, the current research component discovered that Stanford data were not homogeneous: Delgado Junior College administered Intermediate Battery I (Form W) to all of its students; Seattle tested most of its pupils with the Intermediate Battery I (Form Y) and some of its students with the Intermediate Battery II (Form Y); and TVI administered

Intermediate Battery II (Form W) to all of its students. Evidently there was some confusion as to which level battery should be administered. Table 1 illustrates the distribution of students who took the Stanford Achievement Test, according to school, sex and battery level.

Because the battery levels administered were different, the test results could neither be combined nor compared.

Table 1
Stanford Achievement Test: Former Student Data Set

School	Intermediate I			Intermediate II		
	Male	Female	Total	Male	Female	Total
Delgado Junior College	53	30	83	0	0	0
Seattle Community College	36	18	54**	6	3	9***
Technical Vocational Institute	-	-	0	72	60	132*
TOTALS	89	48	137	78	63	141

* All but L and SP data are missing on one individual

** AA datum is missing on one individual

*** SS & SC data are missing on one individual

In addition, some of the students who had taken the Intermediate Battery I topped out on one or more subtests with a score of 9.5+, indicating inappropriate test battery selection. Such instances reduced the usefulness of the test and its results.

2. Current Student Stanford Data. In response to the need for a common base for comparison in addition to the indicated need for

higher level battery selection, the current research component recommended administration of the Stanford Achievement Intermediate Battery II (Form X) to every student entering the program in the Spring 1972 through Spring 1973 semesters (quarters). Table 2 indicates the number of current students in the sample who were tested.

Table 2

Stanford Achievement Test: Current Student Data Set

School	Intermediate II		
	Male	Female	Total
Delgado Junior College	14	14	28
Seattle Community College	15	11	26
Technical Vocational Institute	15	15	30
TOTALS	44	40	84

The current students were tested in February and March of 1973 by program preparatory teachers. Research team members were present at the Delgado testing only, since the other programs could not coordinate test times with research team arrival. However, the research team was able to transcribe most test scores from original scoring sheets out of student files. Data unavailable to the research team at this time was transcribed onto test data forms (See Appendix A) by each program and mailed to the research component.

D. Results

Grade (equivalent) scores, which are transformed raw scores, were used in all profiles and statistical calculations. The former student achievement profiles are given in two sets of figures: Figures 1 through 4 illustrate the profiles of students to whom the Stanford Intermediate I Battery was administered, and Figures 5 through 8 are plotted graphs of Stanford Intermediate Battery II grade scores. The Stanford grade score means, calculated to the nearest hundredth, are given in Tables 3 and 4, respectively, for each of the above-mentioned figure sets. The achievement profiles of the current student sample (validation sample) appear in Figures 9 through 13. The Stanford Battery II means of the current student sample are given in Table 5. Figure 14 is a graphic comparison of the current and former student sample achievement profiles.

1. Former Student Data: Stanford Achievement Test (Figs. 1-8). For Intermediate Battery I, the first figure indicates that hearing impaired students entered the model post-secondary programs showing highest achievement in Arithmetic Computation ($\overline{X}$ = 6.95), Spelling ($\overline{X}$ = 6.94) and Social Studies ($\overline{X}$ = 5.92). Poorest performance is indicated on the Word Study Skills subtest ($\overline{X}$ = 3.25), the results of which are not considered meaningful or valid; as already noted, this subtest measures the examinee's ability to identify the sound pattern of words, an ability predicated upon normal auditory functioning. The Word Meaning and Paragraph Meaning subtests also indicate low achievement. The combined results of these subtests assess the student's overall ability. Reading comprehension skills for hearing impaired students

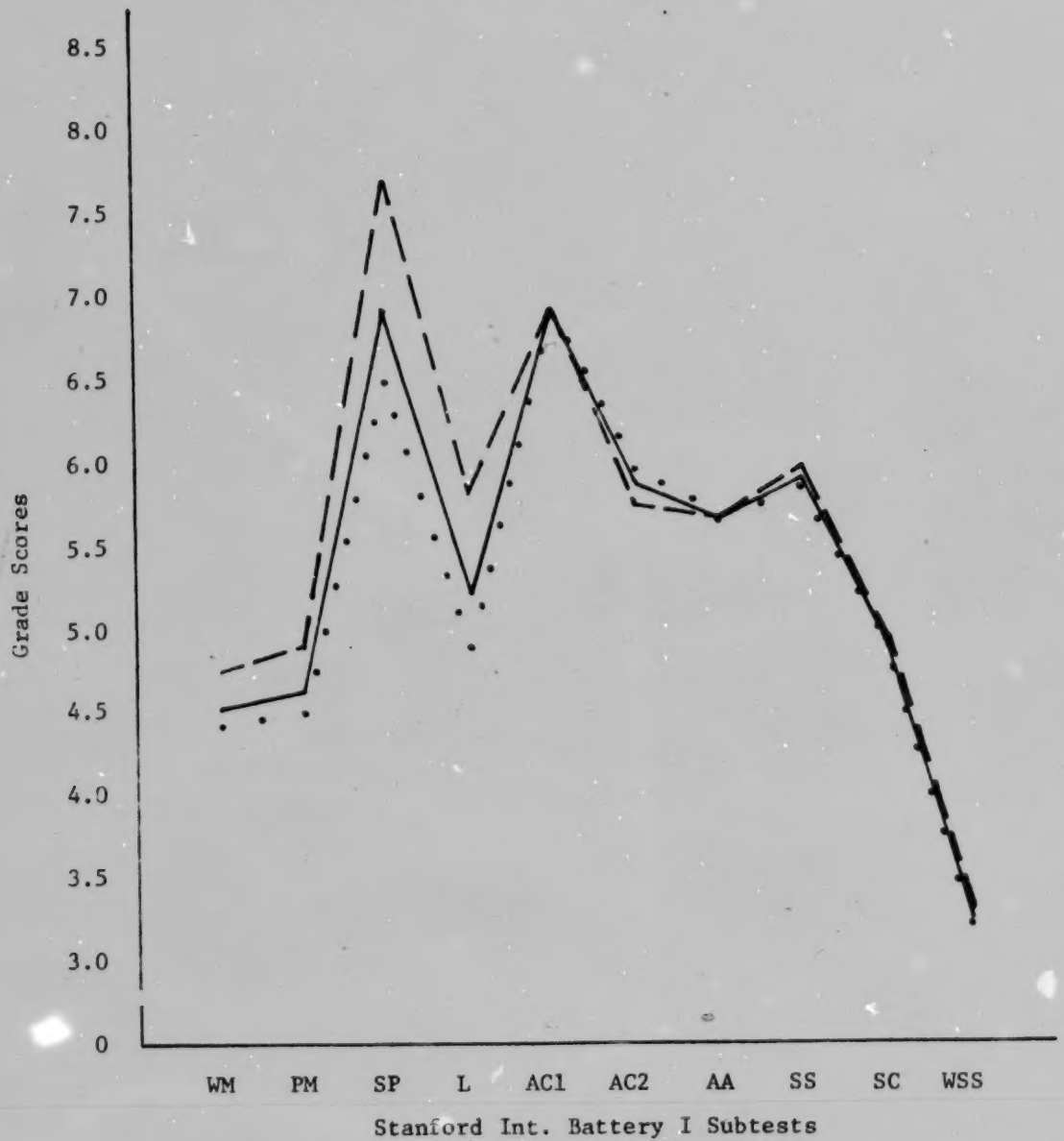
become lower relative to other academic areas, generally at the 4th grade level (Annual Survey of Hearing Impaired Children and Youth, Series D, #9, 1972). An analysis of variance for differences between males and females on each of the subtest means indicated that females scored significantly higher on the Spelling ($F = 19.77$, $df = 136$, $p < .001$) and Language ($F = 9.36$, $df = 136$, $p < .005$) subtests than the males. Significant differences between the sexes were not found on the remaining subtests.

A comparison of the Delgado and Seattle Stanford Battery I profiles are presented in Figure 2. All of the Seattle sample subtest means are higher than those of the Delgado sample with significant differences indicated at the $p < .001$ level on the Paragraph Meaning, Language, Arithmetic Concepts, Arithmetic Applications, Social Studies and Science subtests, at the $p < .01$ level on the Word Study Skills Test, and at the $p < .05$ level on the Word Meaning Subtest.

Figures 3 and 4 illustrate the sex profile differences within the Delgado and Seattle school samples, respectively. These profiles are consistent with the Total Male and Total Female configurations presented in Figure 1, with the exception of the Seattle Female profile; it ascends rather than descends on the Arithmetic Applications (AA) subtest, a result similarly found on the AA subtest of the Intermediate Battery II (see below).

Figure 1

Former Student Data: Means of Stanford Achievement Intermediate Battery I Grade Scores for Total, Female and Male Deaf Populations

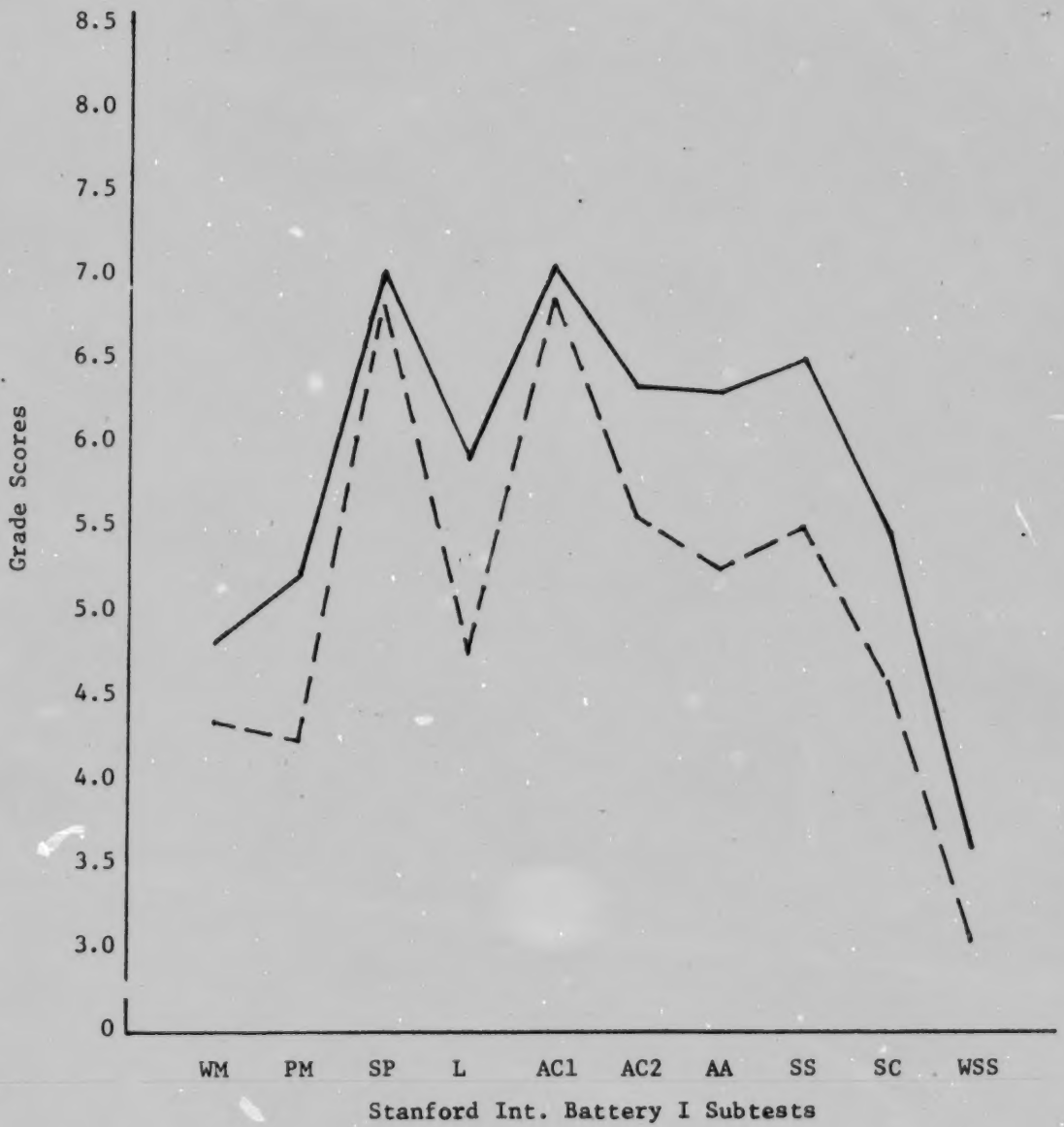


——— Total Deaf Population (N=137)
— — Female Deaf Population (N=48)
. . . Male Deaf Population (N=89)

WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science
WSS- Word Study Skills

Figure 2

Former Student Data: Means of Stanford Achievement Intermediate Battery I Grade Scores for Delgado and Seattle Deaf Populations

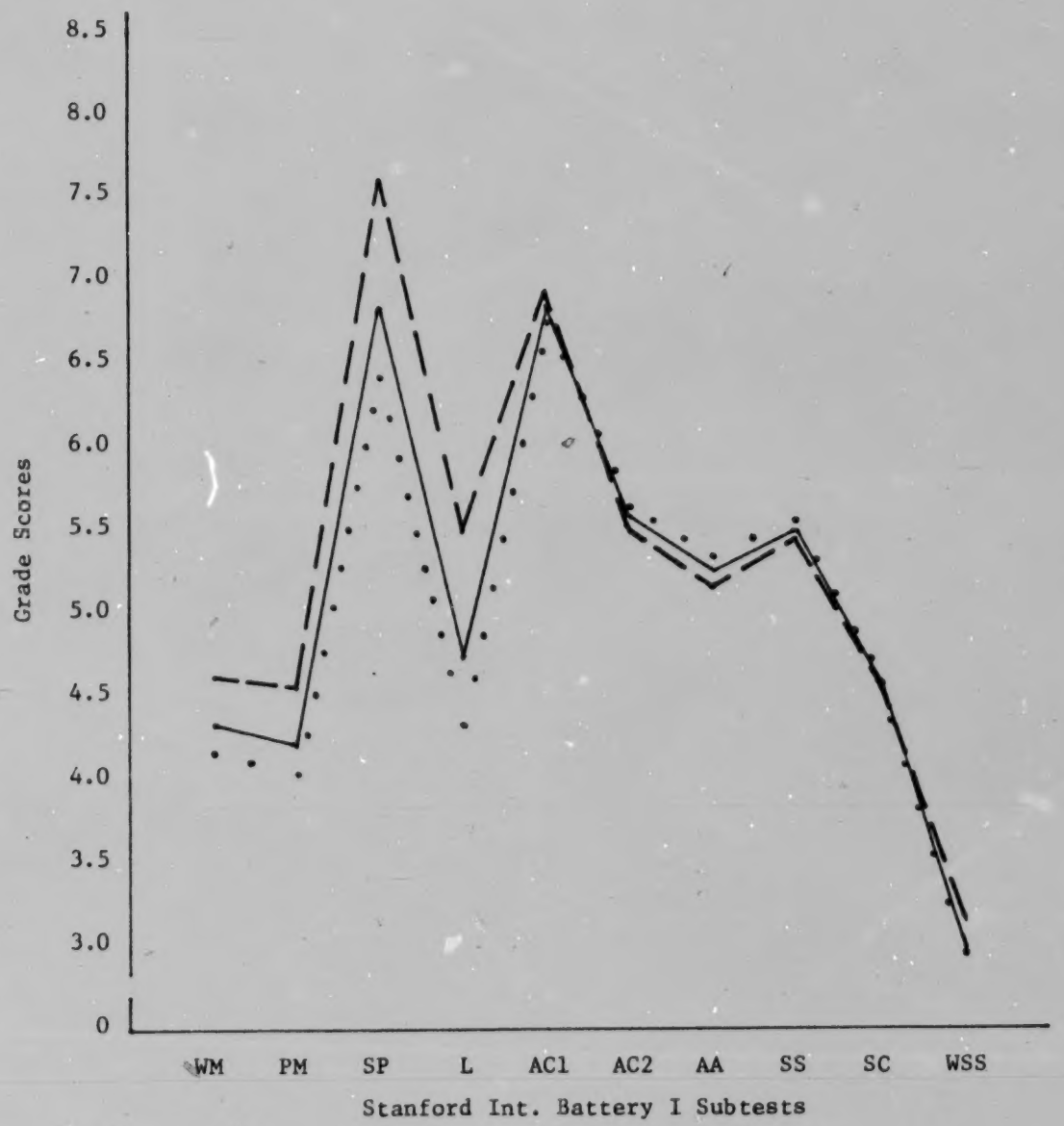


— — Total Delgado Deaf Population (N=83)
——— Total Seattle Deaf Population (N=54)

WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science
WSS- Word Study Skills

Figure 3

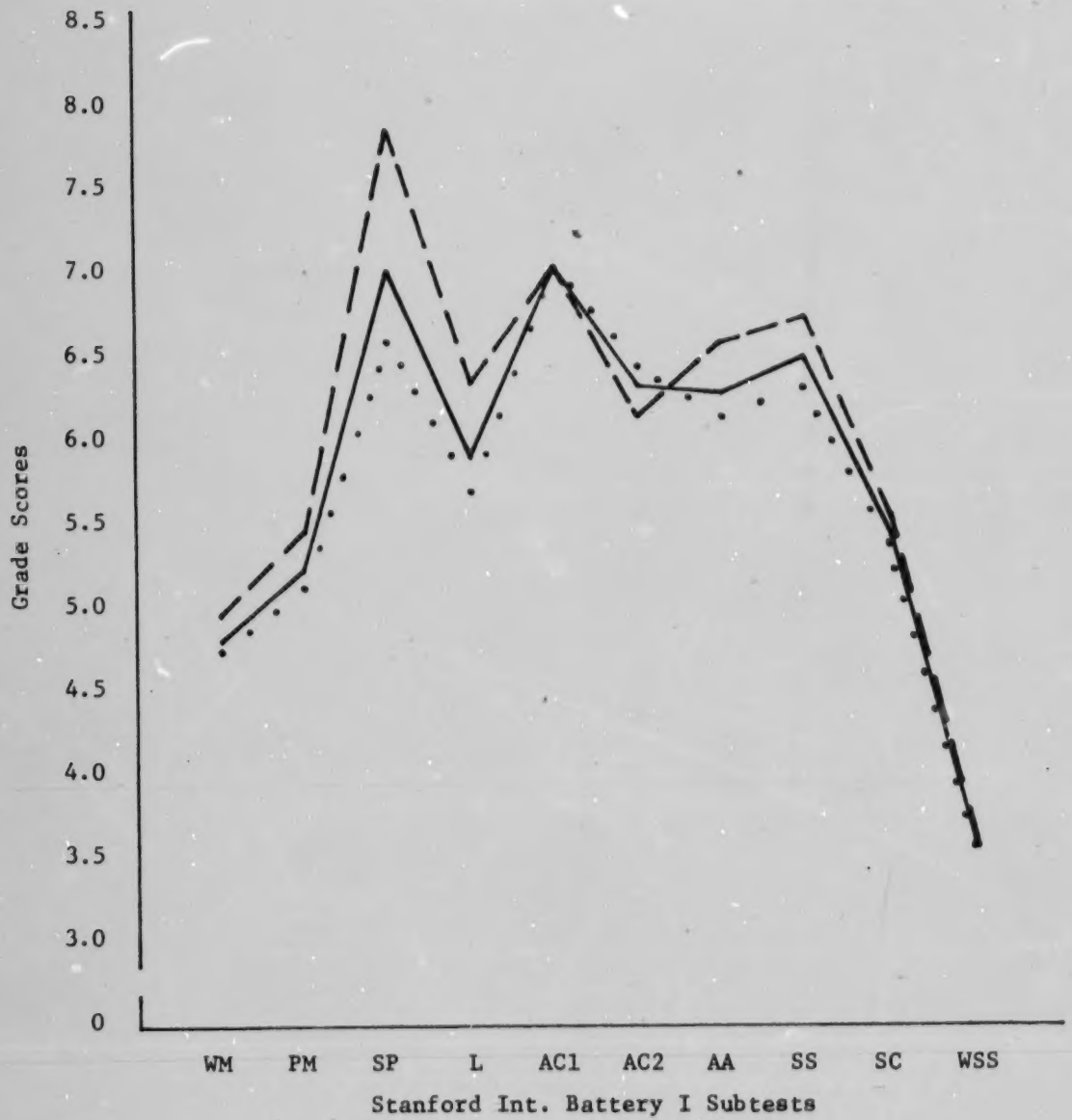
Former Student Data: Means of Stanford Achievement
Intermediate Battery I Grade Scores for
Delgado Total, Female and Male Deaf Populations



—— Delgado Total Deaf Population (N=83)
– – Delgado Female Deaf Population (N=30)
. . . Delgado Male Deaf Population (N=53)
WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science
WSS- Word Study Skills

Figure 4

Former Student Data: Means of Stanford Achievement
Intermediate Battery I Grade Scores for
Seattle Total, Female and Male Deaf Populations



—— Seattle Total Deaf Population (N=54)
– – Seattle Female Deaf Population (N=18)
. . . Seattle Male Deaf Population (N=36)
WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science
WSS- Word Study Skills

Table 3

Former Student Data: Means of Stanford Achievement Intermediate Battery I Grade Scores by School and Sex

SCHOOL	SEX		Stanford Intermediate Battery I									
			WM	PM	SP	L	AC1	AC2	AA	SS	SC	WSS
DELGADO	F	$\bar{X}$	4.62	4.58	7.62	5.50	6.94	5.51	5.17	5.46	4.57	3.15
		N	30	→								→
	M	$\bar{X}$	4.19	4.05	6.43	4.34	6.84	5.63	5.35	5.56	4.60	2.96
		N	53	→								→
	TOT	$\bar{X}$	4.35	4.24	6.86	4.76	6.88	5.59	5.28	5.52	4.59	3.03
		N	83	→								→
SEATTLE	F	$\bar{X}$	4.98	5.49	7.90	6.39	7.07	6.19	6.62	6.87	5.57	3.57
		N	18	→								→
	M	$\bar{X}$	4.77	5.15	6.63	5.73	7.06	6.46	6.18	6.35	5.44	3.61
		N	36	→				→	35	36	→	→
	TOT	$\bar{X}$	4.84	5.26	7.05	5.95	7.07	6.37	6.33	6.52	5.48	3.60
		N	54	→				→	53	54	→	→
TVI	F	$\bar{X}$										
		N										
	M	$\bar{X}$										
		N										
	TOT	$\bar{X}$										
		N										
TOTAL	F	$\bar{X}$	4.76	4.91	7.72	5.84	6.99	5.77	5.71	5.99	4.95	3.31
		N	48									
	M	$\bar{X}$	4.43	4.50	6.51	4.90	6.92	5.97	5.68	5.88	4.94	3.22
		N	89	→				→	88	89	→	→
	TOT	$\bar{X}$	4.54	4.64	6.94	5.23	6.95	5.90	5.69	5.92	4.94	3.25
		N	137	→				→	136	137	→	→

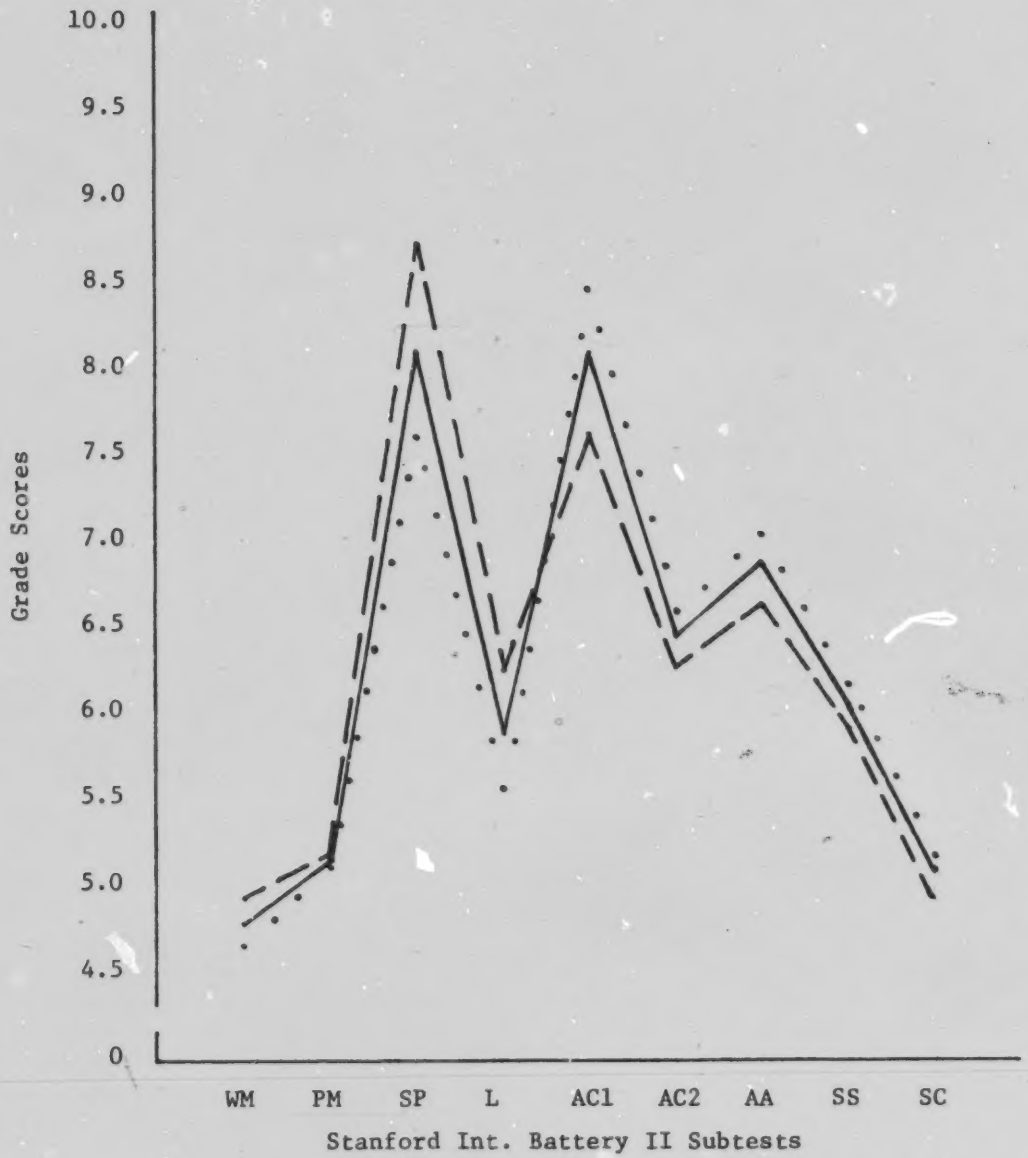
As in Figure 1, Figure 5 of Intermediate Battery II indicates that hearing impaired students show high achievement in Spelling ($\bar{X}$ = 8.14) and Arithmetic Computation ($\bar{X}$ = 8.13). Unlike Figure 1, however, Figure 5 ranks the Arithmetic Applications subtest third in difficulty. The Word Meaning subtest ($\bar{X}$ = 4.80) indicates poorest performance, followed by the Science ($\bar{X}$ = 5.09) and Paragraph meaning ($\bar{X}$ = 5.18) subtests. Analysis of variance for differences between the sexes indicates that females scored significantly higher than the males on the Spelling ($F = 10.09$, $df = 140$, $p < .005$) and Language ($F = 5.95$, $df = 140$, $p < .025$) subtests, and that males scored significantly higher on the Arithmetic Computation subtest ($F = 5.6948$, $df = 139$, $p < .025$).

A comparison of the Seattle and TVI Stanford Battery II profile is given in Figure 6. Significant differences between schools were found on the Word Meaning ($F = 4.56$, $df = 139$, $p < .05$) and Social Studies ($F = 5.2759$, $df = 138$, $p < .025$) subtests; in each case, Seattle subtest means were higher than TVI's (note -- Seattle's sample consists of 9 subjects, whereas TVI's N equals 132).

Figures 7 and 8 illustrate the profiles of males and females within the Seattle and TVI samples, respectively. Even though Seattle's sample size is statistically small, the female, male and total sample graph configurations are congruent to TVI's, with the exception of the Arithmetic Applications and Social Studies coordinates. It appears that the TVI sample determines the configurations illustrated in Figure 5; the Figure 5 and Figure 8 profiles are practically identical. TVI's sample size, which is extremely large relative to Seattle's, will obviously be more strongly reflected in the Total, Total Female and Total Male groups.

Figure 5

Former Student Data: Means of Stanford Achievement Intermediate Battery II Grade Scores for Total, Female, and Male Deaf Populations

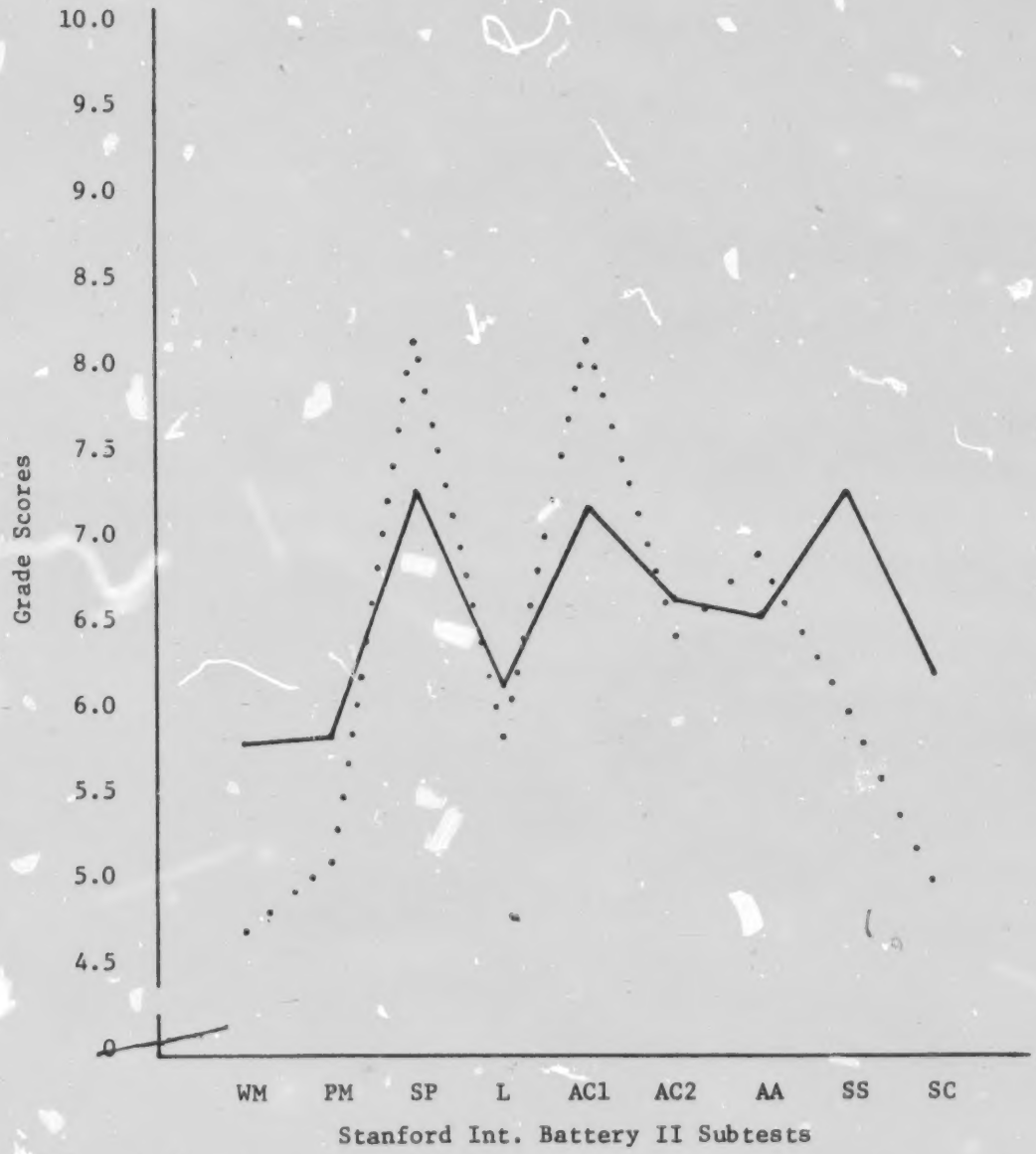


——— Total Deaf Population (N=141)
— — Female Deaf Population (N=63)
. . . Male Deaf Population (N=78)

WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Figure 6

Former Student Data: Means of Stanford Achievement
Intermediate Battery II Grade Scores for
Seattle and TVI Deaf Populations

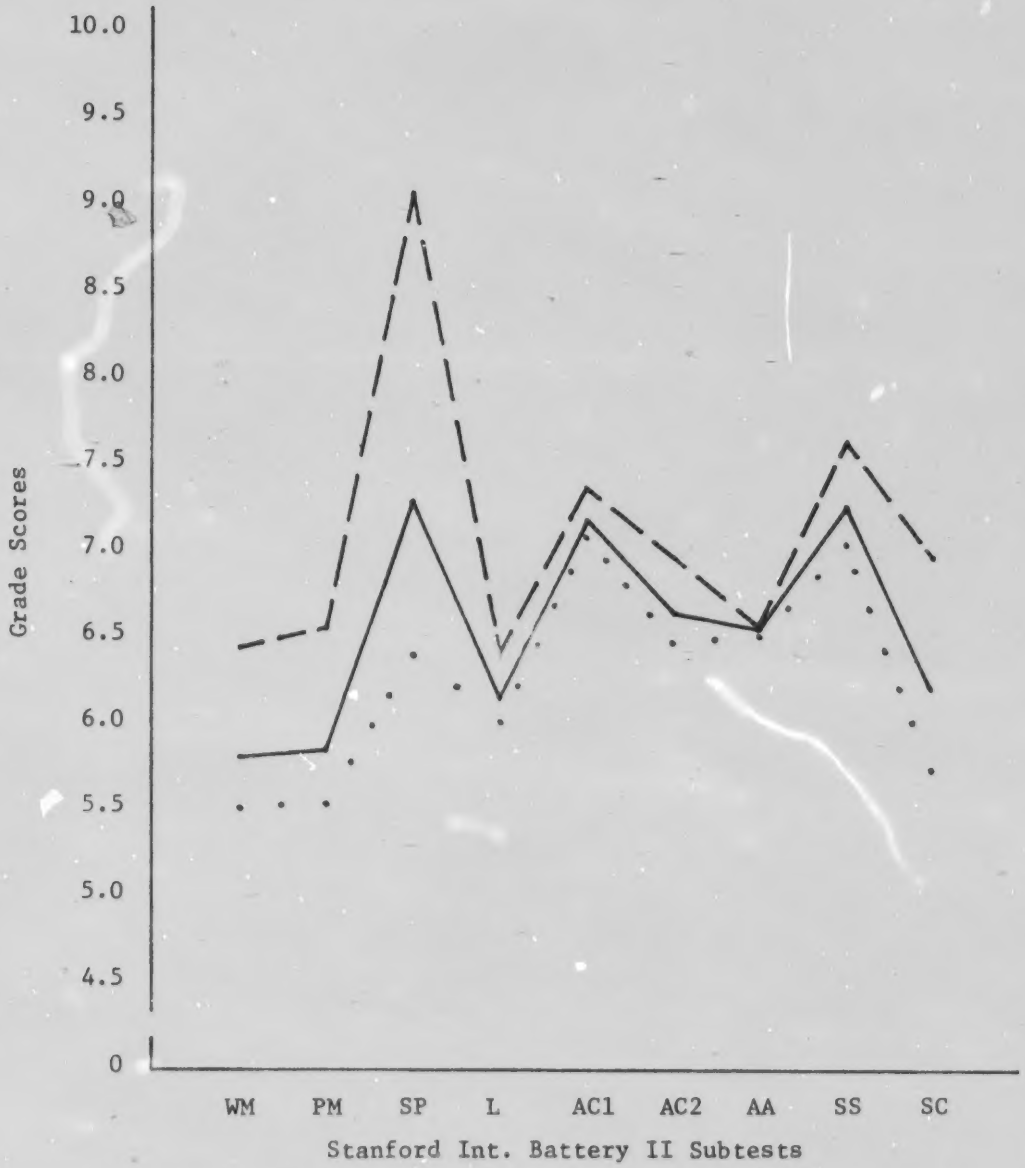


—— Total Seattle Population (N=9)
. . . Total TVI Population (N=132)

WM - Word Meaning
PM - Paragraph meaning
SP - Spelling
L - Language
AC1- Arithemtic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Figure 7

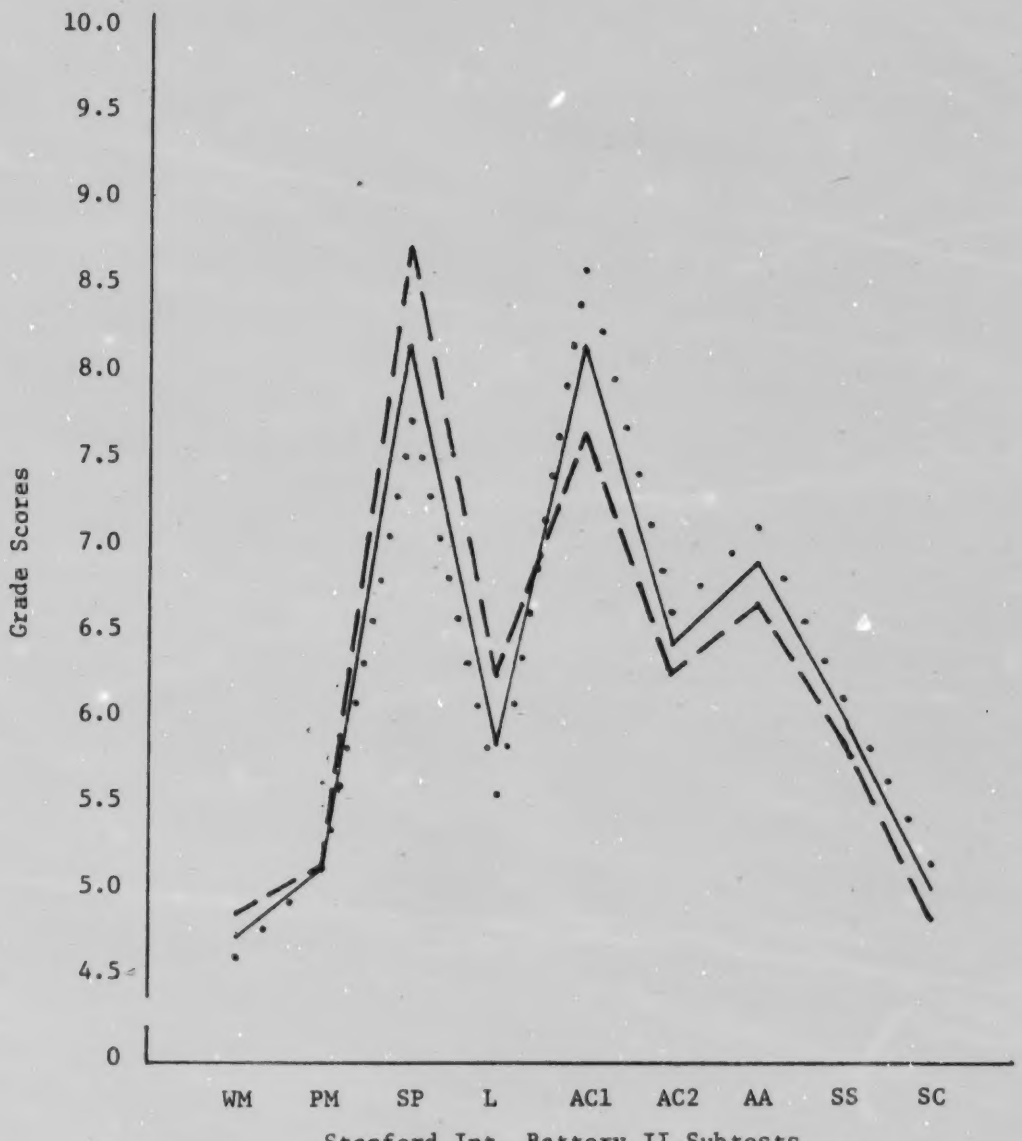
Former Student Data: Means of Stanford Achievement Intermediate Battery II Grade Scores for Seattle Total, Female and Male Deaf Populations



——— Seattle Total Deaf Population (N=9)
— — Seattle Female Deaf Population (N=3)
. . . Seattle Male Deaf Population (N=6)
WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Compuation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Figure 8

Former Student Data: Means of Stanford Achievement
Intermediate Battery II Grade Scores for
TVI Total, Female and Male Deaf Populations



——— TVI Total Deaf Population (N=132)
— — TVI Female Deaf Population (N=60)
. . . TVI Male Deaf Population (N=72)
WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Table 4

Former Student Data: Means of Stanford Achievement Intermediate Battery II Grade Scores by School and Sex

SCHOOL	SEX		Stanford Intermediate Battery II								
			WM	PM	SP	L	AC1	AC2	AA	SS	SC
DELGADO	F	$\bar{X}$									
		N									
	M	$\bar{X}$									
		N									
	TOT	$\bar{X}$									
		N									
SEATTLE	F	$\bar{X}$	6.47	6.57	9.10	6.43	7.40	7.00	6.60	7.67	7.00
		N	3	→							→
	M	$\bar{X}$	5.52	5.53	6.42	6.03	7.12	6.50	6.55	7.08	5.76
		N	6	→					→	5	5
	TOT	$\bar{X}$	5.83	5.88	7.31	6.17	7.21	6.67	6.57	7.30	6.23
		N	9	→					→	8	8
TVI	F	$\bar{X}$	4.87	5.14	8.75	6.27	7.66	6.28	6.67	5.86	4.84
		N	59	59	60	60	59	→			→
	M	$\bar{X}$	4.61	5.13	7.73	5.56	8.62	6.62	7.12	6.13	5.17
		N	72	→							→
	TOT	$\bar{X}$	4.73	5.14	8.19	5.88	8.19	6.46	6.92	6.01	5.02
		N	131	131	132	132	131	→			→
TOTAL	F	$\bar{X}$	4.95	5.21	8.76	6.28	7.65	6.31	6.67	5.95	4.94
		N	62	62	63	63	62	→			→
	M	$\bar{X}$	4.68	5.16	7.63	5.60	8.51	6.61	7.08	6.20	5.21
		N	78	→					→	77	77
	TOT	$\bar{X}$	4.80	5.18	8.14	5.90	8.13	6.48	6.90	6.09	5.09
		N	140	140	141	141	140	140	140	139	139

2. Current Student Data: Stanford Intermediate Battery II (Figs. 9-13). Figure 9, like Figure 5, ranks Spelling ($\bar{X}$ = 8.13), Arithmetic Computation ($\bar{X}$ = 7.85) and Arithmetic Applications ($\bar{X}$ = 6.49) as the first, second and third areas of high achievement of hearing impaired students entering the post-secondary programs. These are followed in increasing difficulty by the academic areas of Arithmetic Concepts, Social Studies, Language, Science, Paragraph Meaning and Word Meaning. Utilizing a one-way analysis of variance, Male-Female differences were once again found in the Spelling ($F = 3.93$, $df = 83$, $p < .05$) and Language ($F = 10.46$, $df = 83$, $p < .005$) subtests, with females achieving significantly higher scores than males on both measures. Differences between schools were indicated on the following subtests:

(a) Word Meaning ($f = 4.02$, $df = 83$, $p < .025$)-- t tests computed for differences between school pairs revealed (i) TVI's sample was significantly lower in achievement than the Seattle sample mean ($t = 2.49$, $p < .02$), (ii) there was no significant difference between the Seattle/Delgado and TVI/Delgado sample means;

(b) Arithmetic Concepts ($F = 3.54$, $df = 83$, $p < .05$) -- t tests showed that (i) Seattle's sample was significantly higher in achievement than Delgado ($t = 2.32$, $p < .05$) on this measure and (ii) the TVI/Delgado and the TVI/Seattle sample means were comparable;

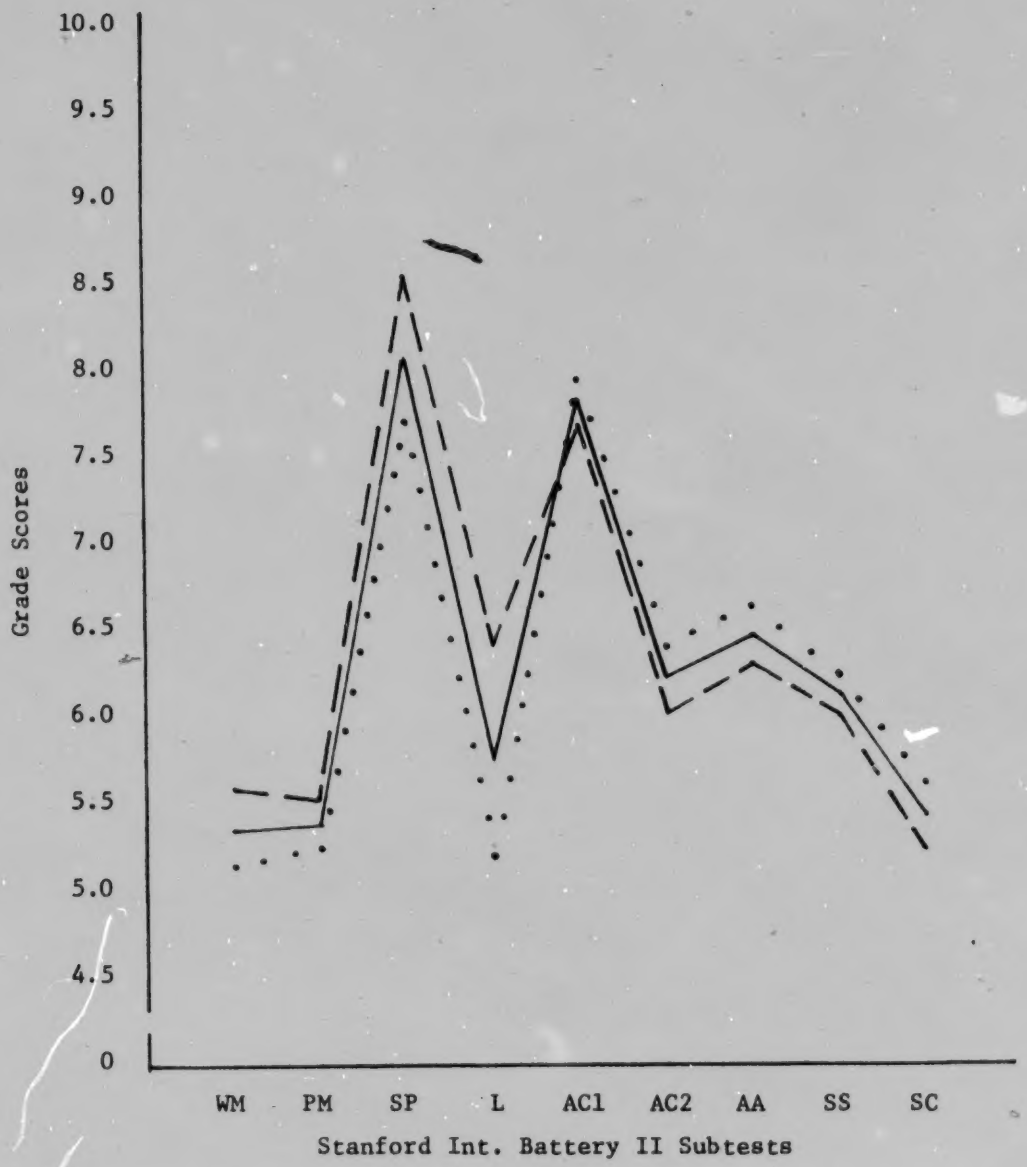
(c) Science ($F = 5.04$, $df = 83$, $p < .01$)-- t tests computed for each school pair indicated that (i) the TVI mean was significantly lower than both the Seattle ($t = 3.14$, $p < .01$) and Delgado ($t = 2.23$, $p < .05$) means and (ii) the difference between Seattle and Delgado means was not significant.

Figure 10 illustrates total school population configurations. With the exception of the WM and AC2 coordinates, the three school profiles are congruent. Figures 11, 12, and 13 include the male and female

population profiles within Delgado, Seattle and TVI. There are no configurational anomalies on the nine achievement measures between sexes within each school, although there are differences in achievement levels. These differences are similar to those discussed above with regard to Figure 9.

Figure 9

Current Student Data: Means of Stanford Achievement Intermediate Battery II Grade Scores for Total, Female and Male Deaf Populations

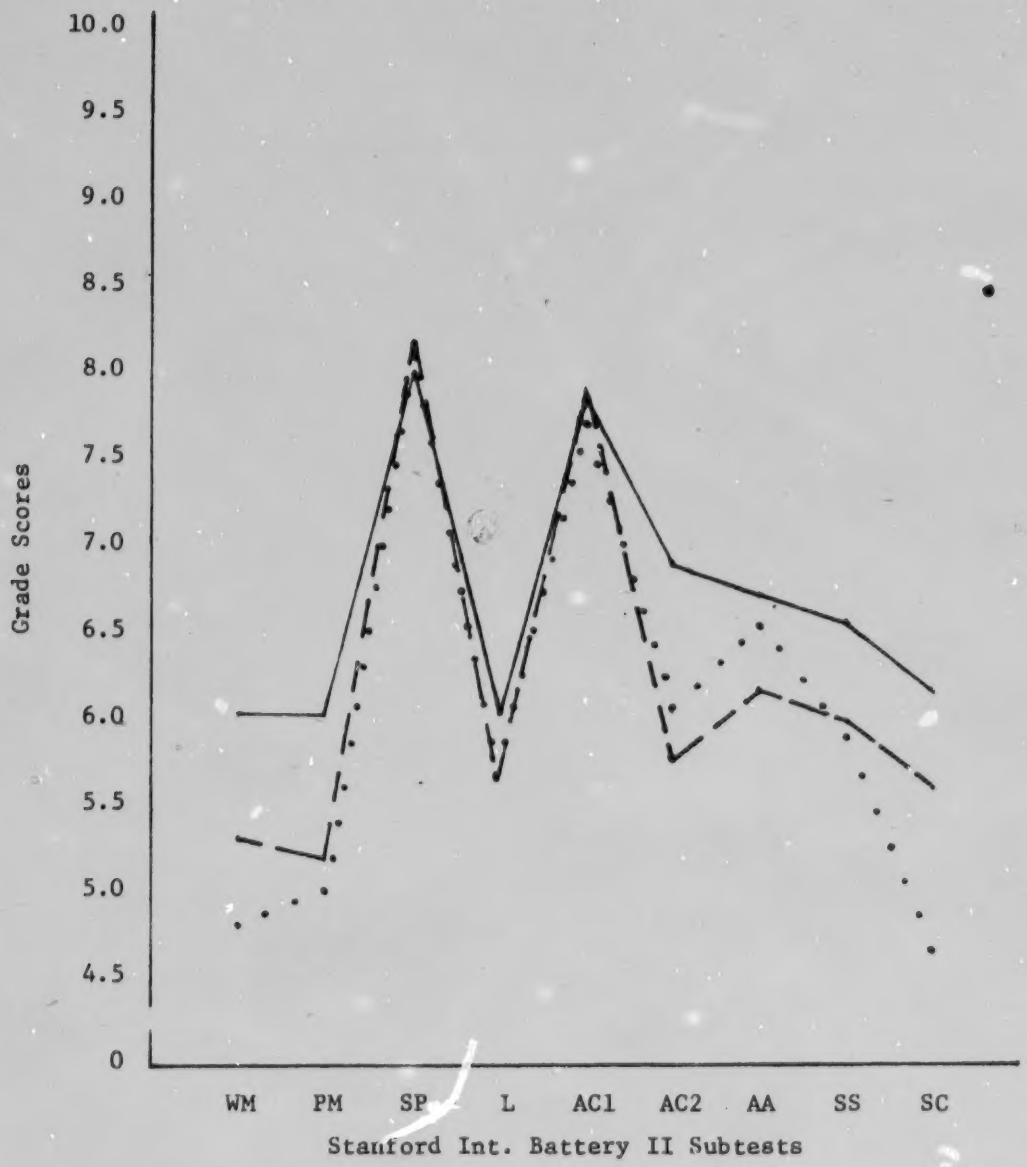


——— Total Deaf Population (N=84)
— — Female Deaf Population (N=40)
. . . Male Deaf Population (N=44)

WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Figure 10

Current Student Data: Means of Stanford Achievement Intermediate Battery II Grade Scores for Delgado, Seattle, and TVI Deaf Populations



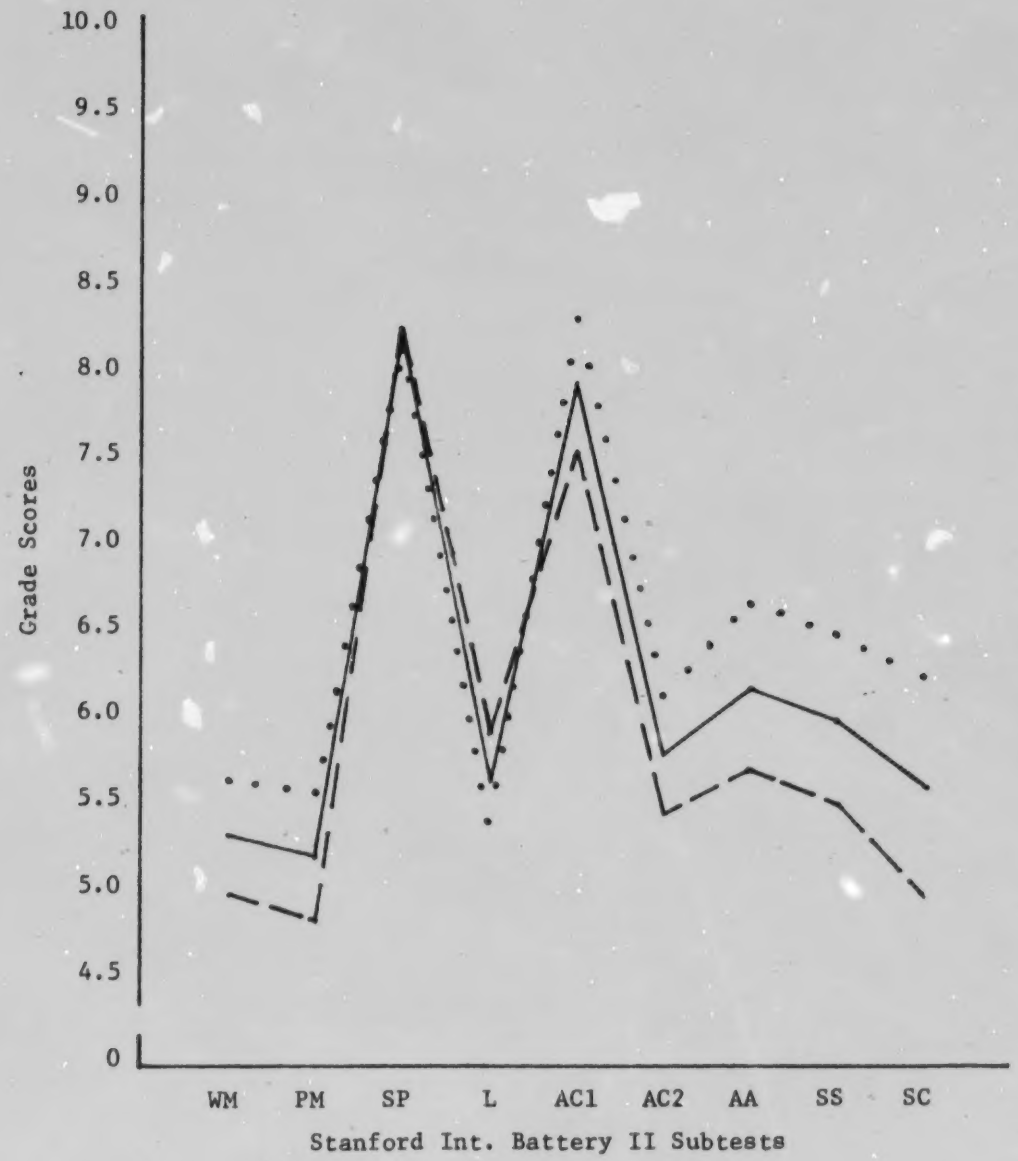
— — Total Delgado Deaf Population (N=28)
——— Total Seattle Deaf Population (N=26)
• • • Total TVI Deaf Population (N=30)

WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling

L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Figure 11

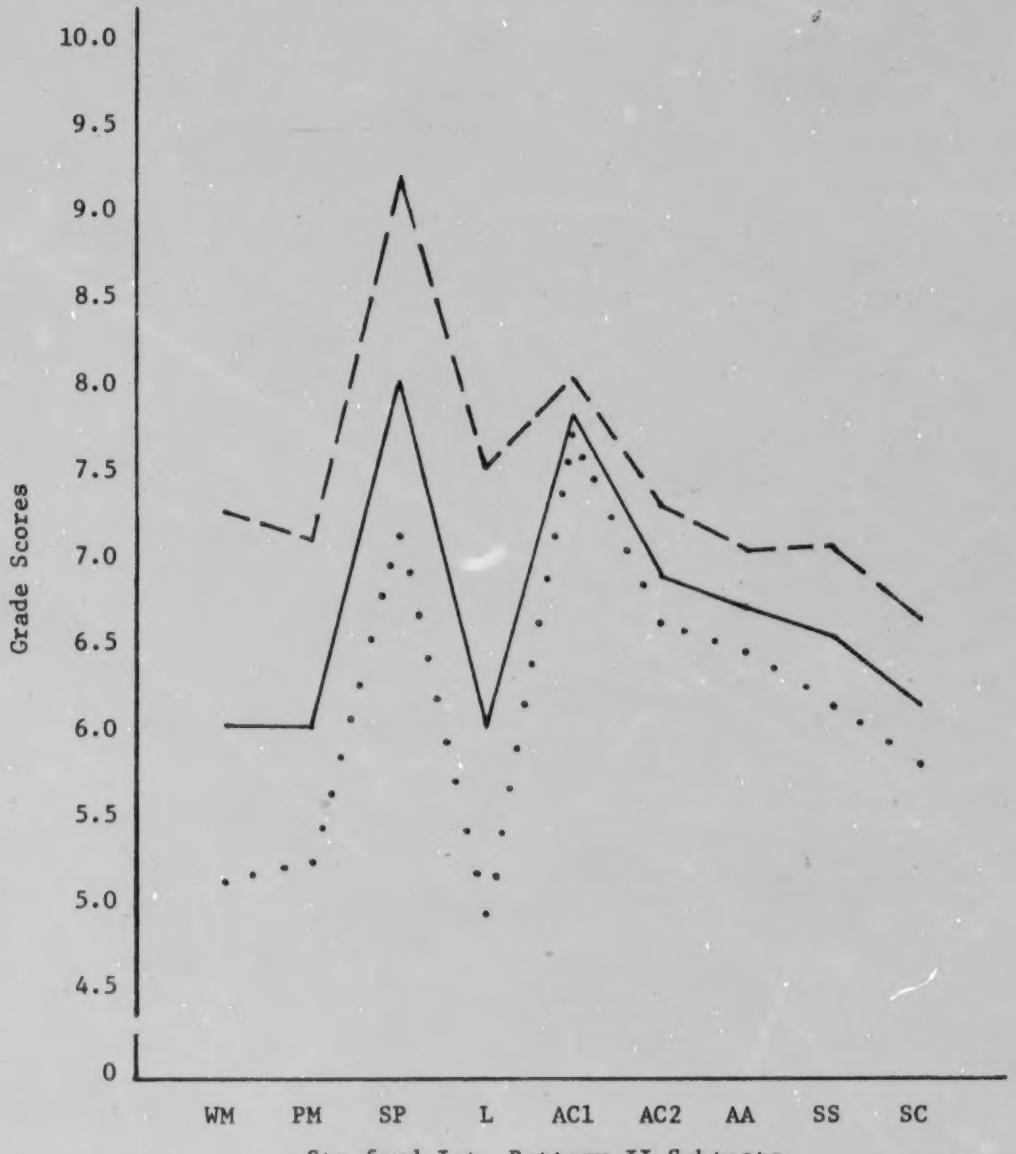
Current Student Data: Means of Stanford Achievement Intermediate Battery II Grade Scores for Delgado Total, Female and Male Deaf Populations



——— Delgado Total Deaf Population (N=28)
— — Delgado Female Deaf Population (N=14)
. . . Delgado Male Deaf Population (N=14)
WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Figure 12

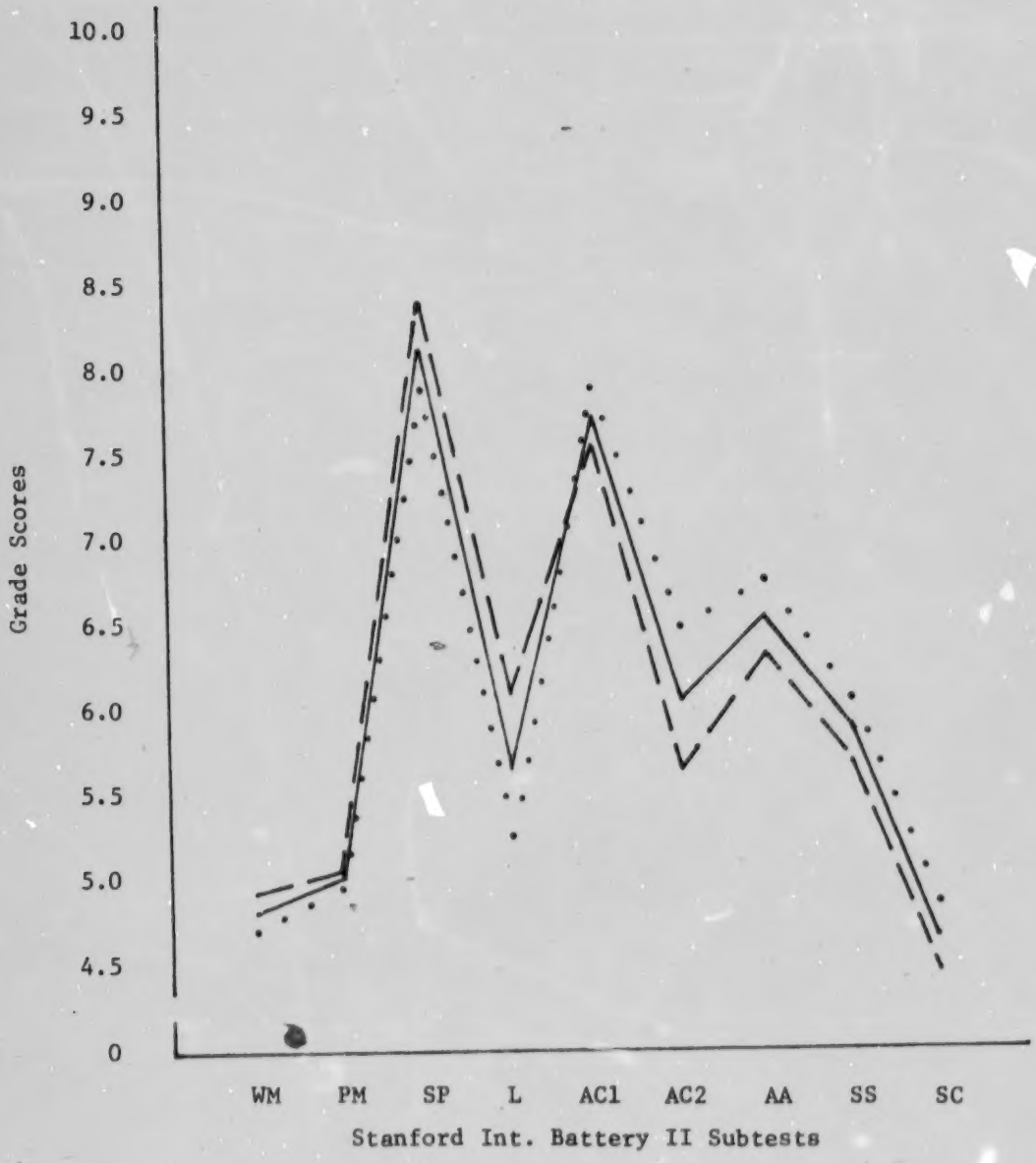
Current Student Data: Means of Stanford Achievement, Intermediate Battery II Grade Scores for Seattle Total, Female and Male Deaf Populations



——— Seattle Total Deaf Population (N=26)
— — Seattle Female Deaf Population (N=11)
. . . Seattle Male Deaf Population (N=15)
WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Figure 13

Current Student Data: Means of Stanford Achievement Intermediate Battery II Grade Scores for TVI Total, Female and Male Deaf Populations



——— TVI Total Deaf Population (N=30)
— — TVI Female Deaf Population (N=15)
. . . TVI Male Deaf Population (N=15)
WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

Table 5

Current Student Data: Means of Stanford Achievement Intermediate Battery II Grade Scores by School and Sex

SCHOOL	SEX		Stanford Intermediate Battery II								
			WM	PM	SP	L	AC1	AC2	AA	SS	SC
DELGADO	F	$\bar{X}$	4.99	4.82	8.26	5.92	7.56	5.46	5.71	5.51	4.98
		N	14								
	M	$\bar{X}$	5.66	5.59	8.17	5.41	8.34	6.14	6.68	6.50	6.24
		N	14								
	TOT	$\bar{X}$	5.33	5.21	8.22	5.66	7.95	5.80	6.19	6.00	5.61
		N	28								
SEATTLE	F	$\bar{X}$	7.30	7.13	9.21	7.55	8.06	7.32	7.08	7.10	6.67
		N	11								
	M	$\bar{X}$	5.13	5.25	7.14	4.95	7.75	6.63	6.49	6.18	5.82
		N	15								
	TOT	$\bar{X}$	6.05	6.05	8.02	6.05	7.88	6.92	6.74	6.57	6.18
		N	26								
TVI	F	$\bar{X}$	4.94	5.07	8.41	6.11	7.57	5.67	6.33	5.70	4.46
		N	15								
	M	$\bar{X}$	4.71	4.97	7.90	5.28	7.91	6.50	6.79	6.09	4.87
		N	15								
	TOT	$\bar{X}$	4.82	5.02	8.15	5.69	7.74	6.09	6.56	5.90	4.67
		N	30								
TOTAL	F	$\bar{X}$	5.61	5.55	8.58	6.44	7.70	6.05	6.32	6.02	5.25
		N	40								
	M	$\bar{X}$	5.15	5.27	7.73	5.21	7.99	6.43	6.65	6.25	5.63
		N	44								
	TOT	$\bar{X}$	5.37	5.40	8.13	5.79	7.85	6.25	6.49	6.14	5.44
		N	84								

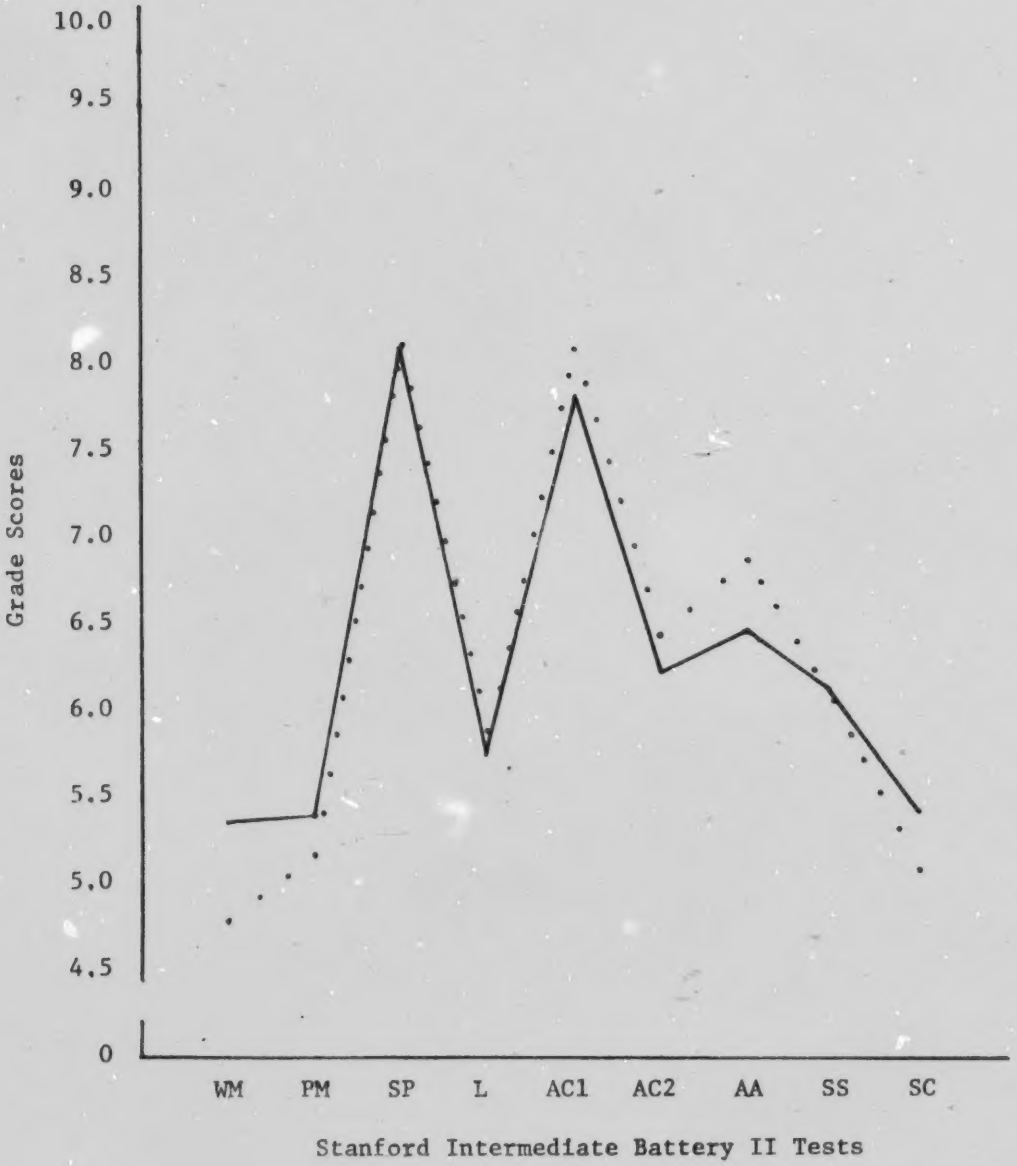
Figure 14 illustrates the profiles of the total former student sample and the total current student sample. The configuration of the current student graph is congruent to the former student profile. T tests for differences between populations on all but one subtest measure. The WM subtest was significant at the $p < .01$ level ($t = 2.6$). This anomaly can be explained by the fact that the current student sample consists of 141 subjects of which 132 are TVI students, who, according to figures 6 and 10, achieve lower on the WM subtest than Seattle and Delgado subjects. Support for this reasoning is indicated by the results of t tests computed for differences between current and former student samples by school. These results are as follows:

1. Difference between TVI current and TVI former student samples -- $t = .35$ (not significant)
2. Difference between Seattle current and Seattle former student samples -- $t = .20$ (not significant)
3. Difference between TVI and Seattle current student samples -- $t = 2.49$ (significant, $p < .02$)
4. Difference between TVI and Delgado current student samples -- $t = 1.78$ (not significant)
5. Difference between Seattle and Delgado current student samples -- $t = 1.39$ (not significant)

The information presented above is sufficient to validate the Stanford Achievement Test data of the former student data set, since it establishes statistical and configurational conformity between former and current student data.

Figure 14

Comparison of the Total Population
Profiles of Current and Former Student Samples:
Stanford Achievement Intermediate Battery II



——— Current Student Population (N=84)
. . . Former Student Population (N=141)

WM - Word Meaning
PM - Paragraph Meaning
SP - Spelling
L - Language
AC1- Arithmetic Computation
AC2- Arithmetic Concepts
AA - Arithmetic Applications
SS - Social Studies
SC - Science

THE GENERAL APTITUDE TEST BATTERY AND THE NON READING MEASURE OF GENERAL INTELLIGENCE

The United States Employment Service (USES) developed the General Aptitude Test Battery (GATB) in 1947. It was standardized on a general working population of 4,000 individuals. The GATB is recognized as one of the best multiple aptitude test batteries for use in vocational guidance because of its extensive research base.

Many hearing impaired individuals have insufficient English language skills and, therefore, have not developed adequate reading skills to be tested properly on tests which contain verbal material in the items. The general intelligence subtest of the GATB (G Aptitude) is such a test. The nonreading measure of general intelligence ("g") was, therefore, selected as a substitute measure for the G Aptitude of the GATB. The GATB subtests and "g" will be discussed concomitantly in the paragraphs to follow.

A. Test Description

1. The General Aptitude Test Battery. The GATB second edition (Form B-1002) is generally used as an aid in the vocational counseling of individuals within the age range of 18-54 years. The battery is composed of 12 tests (parts) that are considered good measures of nine aptitudes found to be important for successful performance in a wide range of occupations. Eight of these tests are paper and pencil tests, four are apparatus tests. The paper and pencil tests are contained in three test booklets. Two apparatus tests involve the use of the USTES Pegboard and two involve the use of the USTES Finger Dexterity Board. The tests are as follows:

Part 1 -- Name Comparisons: This test consists of a list of pairs of names. The examinee is asked to indicate whether the names are the same or different. Clerical perception is measured by this test.

Part 2 -- Computation: This part measures numerical aptitude. It is composed of exercises in addition, subtraction, multiplication and division of whole numbers.

Part 3 -- Three-dimensional Space: This consists of a series of exercises involving a stimulus figure and four drawings of three-dimensional objects. The stimulus figure is pictured as a two-dimensional object that can be either bent, or rolled or both. Lines in the stimulus item indicate where it is to be bent to form a three-dimensional object. The examinee must select from the four three-dimensional objects, the one that can be made from the stimulus figure. This test measures intelligence and spatial aptitude.

Part 4 -- Vocabulary: The vocabulary test is composed of sets of four words from which the examinee selects the two words that have either the same or opposite meaning. Part 4 measures intelligence and verbal ability.

Part 5 -- Tool Matching: A series of exercises containing a stimulus drawing and four black and white drawings of shop tools constitute Part 5. The examinee selects from the four drawings the one that is the exact replica of the stimulus object. Form perception is assessed by this test.

Part 6 -- Arithmetic Reason: Part 6 measures intelligence and numerical aptitude. Mathematical problems expressed verbally must be solved.

Part 7 -- Form Matching: Form matching consists of two groups of line drawings. The examinee is asked to indicate which figure in the second group is the same size and shape as each figure in the first group. Form perception is measured.

Part 8 -- Mark Making: This test consists of a series of squares in which the examinee is to make three pencil marks, working as rapidly as possible. The marks to be made are short lines, two vertical and one horizontal line beneath them. Part 8 assesses motor coordination.

Part 9 -- Place: The Place test involves the use of the USTES Pegboard which is divided into upper and lower sections, each section containing 48 holes. The upper section contains 48 pegs. These are to be moved two at a time, one in each hand, from the upper to the lower section by the examinee. This is performed three times as rapidly as possible. Manual dexterity is measured.

Part 10 -- Turn: Part 10 is another measure of manual dexterity. The same equipment described under Part 9 is also used for this test. However, for part 10, the lower half of the board contains the pegs. Using his preferred hand, the examinee removes a peg, turns the peg upside down, and returns the peg to the whole from which it was taken. Once again the examinee must work rapidly. Three trials are given for this task.

Part 11 -- Assemble: This test involves the use of the USTES Finger Dexterity Board, which contains 50 holes and a supply of washers and small rivets. Using his preferred hand, the examinee removes a rivet from a hole in the upper board section while he removes a washer from a vertical rod with the other hand, and places the washer on the rivet; the examinee then places the assembled piece into the corresponding hole in the lower board section. The examinee is asked to work rapidly. This task measures finger dexterity.

Part 12 -- Disassemble: Part 12 also measures finger dexterity. The same equipment is used as in part 11. The examinee is asked to remove the rivet assembly from the lower board with his preferred hand, slide the washer to the bottom of the board, put the washer on the vertical rod and place the rivet in the corresponding hole in the upper board section.

The nine aptitudes which are measured by the 12 test parts are defined below. The letter symbol that identifies each aptitude precedes the aptitude name. The aptitude definitions were established on GATB factor analysis studies; the definitions describe the factor being measured rather than the specific test(s) selected to represent the factor. The GATB authors define the nine aptitudes as follows:

Aptitude G - Intelligence --General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school. Measured by Parts 3, 4 and 6.

Aptitude V - Verbal Aptitude --The ability to understand meaning of words and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. Measured by Part 4.

Aptitude N - Numerical Aptitude --Ability to perform arithmetic operations quickly and accurately. Measured by Parts 2 and 6.

Aptitude S - Spatial Aptitude -- Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space. Measured by Part 3.

Aptitude P - Form Perception -- Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and lengths of lines. Measured by Parts 5 and 7.

Aptitude Q - Clerical Perception -- Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread words and numbers, and to avoid perceptional errors in arithmetic computation. A measure of speed of perception which is required in many industrial jobs even when the job does not have verbal or numerical content. Measured by Part 1.

Aptitude K - Motor Coordination -- Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly. Measured by Part 8.

Aptitude F - Finger Dexterity -- Ability to move the fingers, and manipulate small objects with the fingers, rapidly and accurately. Measured by Parts 11 and 12.

Aptitude M - Manual Dexterity -- Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions. Measured by Parts 9 and 10.

GATB subtest norms for specific occupations have been developed by empirical validation research and are provided in the GATB Manual. These norms are established in terms of Occupational Aptitude Patterns (OAP's). Each OAP consists of the most significant aptitude and their cutting scores which are established as minimum sums for groups of occupations having similar requirements.

2. Non Reading Measure of Aptitude G of the GATB. the non reading measure of general intelligence was developed by USES as an interim measure of aptitude G of the GATB for use with individuals who do not have basic reading and arithmetic skills. Based on the results obtained

in the correlation and applicability studies conducted by USES research in December of 1963, a composite consisting of Parts 1, 2 and 3 of the IPAT Culture Fair Test (Scale 2, Form A) and Part 7 of the GATB, B-1002, was found to be the most appropriate non reading measure of apptitude G. The IPAT Culture Fair Tast was developed by Raymond B. Catell. It is intended as a relatively culture free measure of intelligence. There are four parts of the test, but only the first three will be presented here, since only these are of concern. They are described as follows:

Part 1 - Figure Series: A 12-item, three minute test in which the examinee selects the figure that best completes the series.

Part 2 - Figure Classification: A 14-item, four minute test in which the examinee selects the figure that does not belong with the others.

Part 3 - Matrices: A 12-item, three minute test of 2 X 2 matrices in which the examinee selects the figure that best completes the matrix.

Part 7 of the GATB B-1002 substitutes for Part 4 of the IPAT Culture Fair Test. For a description of this test, please refer to the previous discussion.

B. Test Limitations and Qualifications

Like the Stanford Achievement Test, the General Aptitude Test Battery was constructed and standardized on a hearing, vocally proficient population and administered to a deaf, English language handicapped population. This problem is somewhat mediated by the use of the non-reading measure of general intelligence as a substitute for Aptitude G of the GATB. The non reading "g" does not contain the verbal material which is predominant in Aptitude G. However, the problem remains unresolved in the case of Aptitudes V and N. Aptitude V is measured by performance on a vocabulary test, a totally verbally based exam. Computational and arithmetic reasoning tasks assess Aptitude N; the reasoning

tasks are all expressed verbally and the computational exercises are expressed operationally -- only part of this exam presents a language problem. The remaining subtests of the GATB--S, P, Q, K, F, & M--do not contain verbal material except for the test instructions which are given in the English language.

C. Methods and Procedures

The GATB and the Non Reading "g" were administered to all students upon admission to the hearing impaired program. The exams were administered by program counselors proficient in the use of Total Communication. The test manual instructions for each exam were communicated to examinees via total communication. The Delgado and Seattle counselors who administered the exams also scored them; in TVI's case, all test answer sheets were sent to the Office of Manpower Services in St. Paul for computerized scoring. Exam results were compiled by each of the programs and sent to the research component for analysis. Current student data was collected via research team conducted file searches.

1. Former Student GATB and Non Reading "g" data. Tables 6 and 7 illustrate the distributions of (a) students who took the GATB and (b) the number of students on whom Non Reading "g" data were available, by sex and school.

Table 6

General Aptitude Test Battery: Former Student Data Set

School	Female	Male	Total
Delgado Junior College	32	76	108
Seattle Community College	38	65	103
Technical Vocational Institute	72	93	165*
Totals	142	234	376

*"F" and "M" data are missing on six individuals and "F" data only is missing on one individual.

Table 7

Non Reading "g": Former Student Data Set

School	Female	Male	Total
Delgado Junior College	32	76	108
Seattle Community College	37	60	97
Technical Vocational Institute	36	56	92
Totals	105	192	297

2. Current Student GATB and Non Reading "g" data. These include data on a sample of students admitted to one of the three programs in the Spring 1972 through Spring 1973 semesters (quarters). Tables 8 and 9 indicate the number of students on whom (a) GATB and (b) "g" data were available.

Table 8

General Aptitude Test Battery: Current Student Data Set

School	Female	Male	Total
Delgado Junior College	14	14	28
Seattle Community College	11	15	26
Technical Vocational Institute	15	15	30
Totals	40	44	84

Table 9

Non Reading "g": Current Student Data Set

School	Female	Male	Total
Delgado Junior College	14	14	28
Seattle Community College	10	15	25**
Technical Vocational Institute	6	3	9*
Totals	30	32	62

*Manpower Services, the organization which scored the test for TVI could not find data on 21 individuals.

**One student from the Seattle program was not available for testing.

D. Results

Aptitude scores were used in all profiles and calculations. Figures 15 through 19 represent the former student sample aptitude profiles and Figures 20 through 24 illustrate the profiles of the current student sample. The means of the General Aptitude Test Battery subtests and the Nonreading Measure of General Intelligence, calculated to the nearest tenth, are given in Tables 11 and 12, respectively, for each of the above sets of figures.

1. Former Student Data: Nonreading "g" and GATB (Figs. 15-19).

The figures in this set indicate that hearing impaired students entering the post-secondary programs generally show highest aptitude in perceptual abilities and lowest aptitude in verbal abilities. Consistently high mean scores were obtained on Aptitudes P and Q, which are nonverbal measures of perceptual speed, and Aptitude S, a nonverbal measure of visual perception. The Aptitude V mean was the lowest aptitude score, followed by the means of Aptitudes G and N; these depressed scores are the expected results of administering verbal tests to a hearing impaired population. Figure 15 illustrates the aptitude profiles of the Total Female and Total Male samples. An analysis of variance for differences between males and females on each of the aptitude means indicated that females score significantly higher than males on Aptitude P ($F = 5.15$, $df = 375$, $p < .025$), Aptitude Q ($F = 19.34$, $df = 375$, $p < .001$) and Aptitude F ($F = 18.7$, $df = 368$, $p < .001$). Males scored significantly higher than females on Aptitude G ($F = 6.93$, $df = 375$, $p < .01$) and Aptitude S ($F = 20.84$, $df = 375$, $p < .001$). The deaf population obtained aptitude means within one standard

deviation of the hearing population norms ($\bar{X}$ = 100, s.d. = 20 for each variable) on all but two aptitude measures. The deaf population scored 22.5 points below the hearing population mean on Aptitude V and 21.3 points above the norm on Aptitude P (See Figure 15 and Table 9).

A comparison of the GATB and Nonreading "g" aptitude profiles for each of the three programs is presented in Figure 16. These profiles are congruent with the exception of the Aptitude F coordinate: The K-F slope is positive for the Seattle graph and negative for the Delgado and TVI graphs. One way analysis of variance indicated signigicant differences between schools on all GATB subtests (see Table 10). School differences on the Nonreading measure were not significant.

Table 10

Former Student Data: Results of One Way Analyses of Variance for Differences Between Schools on GATB Aptitudes

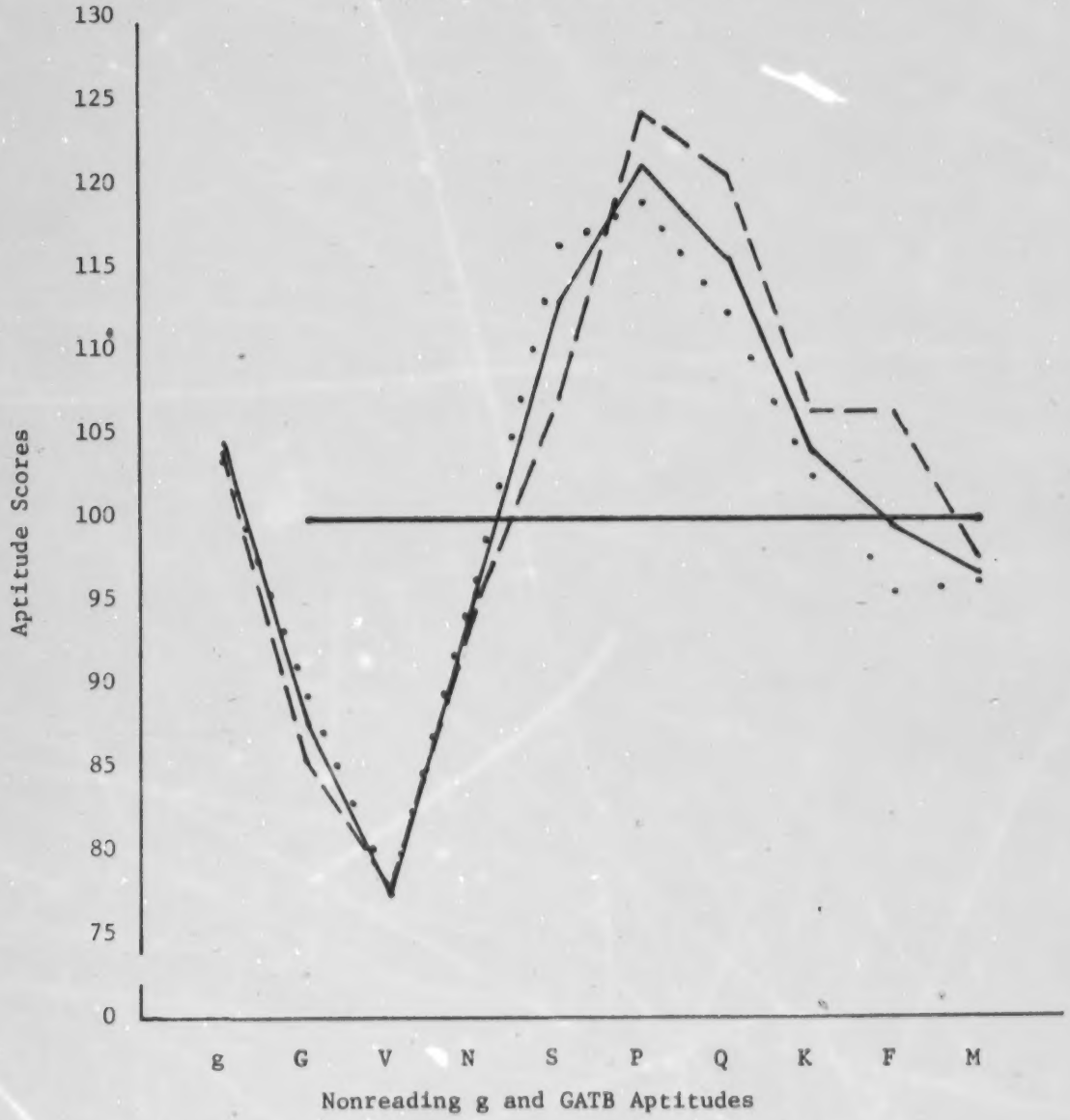
Aptitude	F ratio	df	Probability level
G	11.23	2, 375	$p < .001$
V	5.99	2, 375	$p < .005$
N	11.95	2, 375	$p < .001$
S	9.77	2, 375	$p < .001$
P	26.96	2, 375	$p < .001$
Q	31.62	2, 375	$p < .001$
K	13.75	2, 375	$p < .001$
F	16.69	2, 368	$p < .001$
M	31.19	2, 369	$p < .001$

T tests computed for differences between school pairs revealed that the Delgado sample was significantly lower than the Seattle and TVI samples

on all but Aptitude V of the GATB (these differences are graphically illustrated in Figure 16). The Seattle sample scored significantly higher on the V aptitude than TVI ($t=2.42$, $p < .02$) and Delgado ($t=3.00$, $p < .01$). Figures 17, 18 and 19 illustrate the male and female population profiles within Delgado, Seattle and TVI respectively. These profiles are consistent with the Total Male and Total Female configurations presented in Figure 15.

Figure 15

Former Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for Total, Female, and Male Deaf Populations Compared to Hearing Population Norms

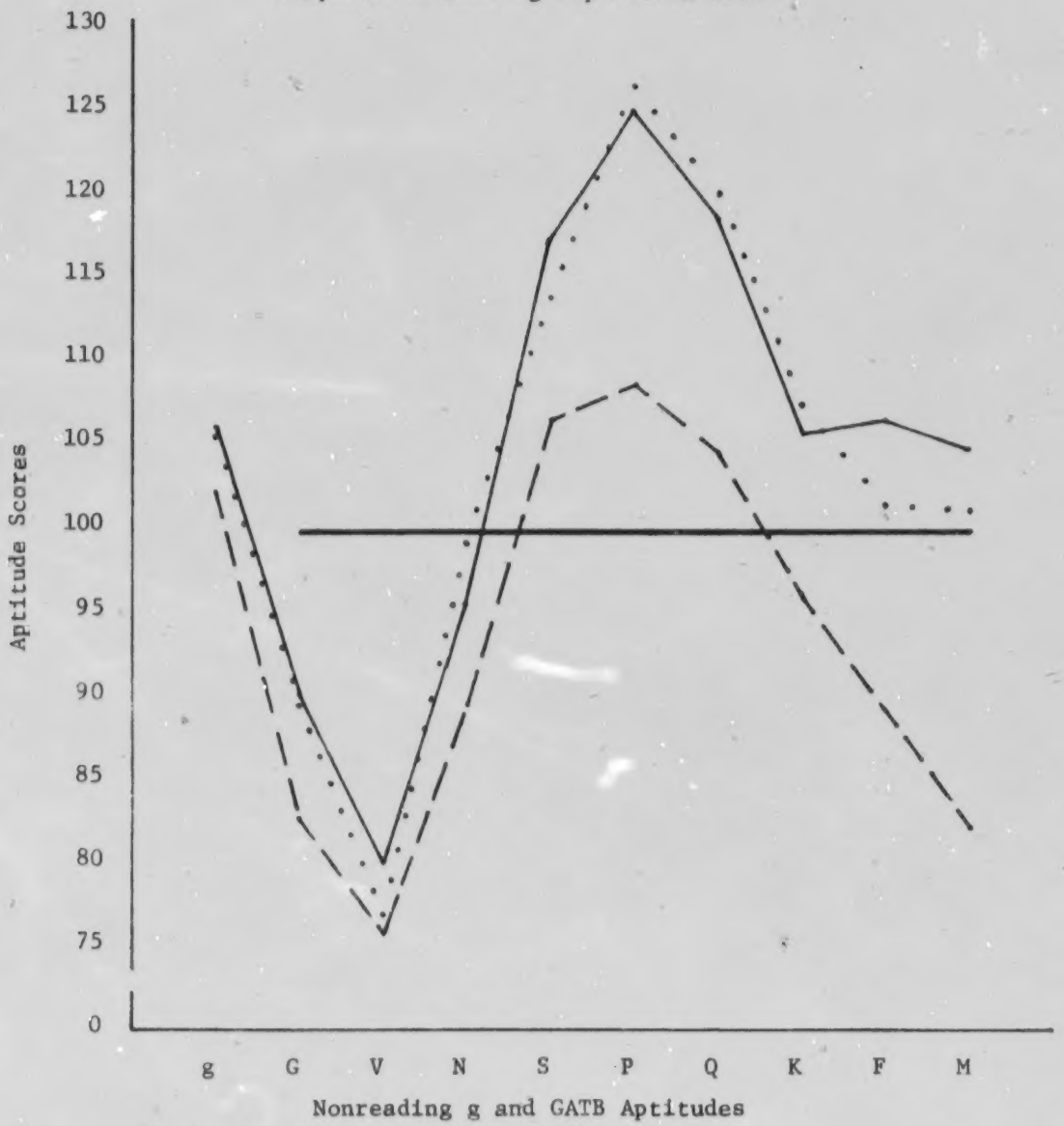


——— Total Deaf Population ("g" - [N=297], GATB - [N=376])
— — Female Deaf Population ("g" - [N=105], GATB - [N=142])
. . . Male Deaf Population ("g" - [N=192], GATB - [N=234])
——— Hearing Population (N=4,000)

g - Nonreading Measure of General Intelligence
G - Reading Measure of General Intelligence
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Figure 16

Former Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for Delgado, Seattle and TVI Deaf Populations Compared to Hearing Population Norms



— — Total Delgado Deaf Population ("g" - [N=108], GATB - [N=108])
—— Total Seattle Deaf Population ("g" - [N= 97], GATB - [N=103])
. . . Total TVI Deaf Population ("g" - [N= 92], GATB - [N=165])
▬▬ Hearing Population Norms (N=4,000)

g - Nonreading Measure of General Intelligence
G - Reading Measure of General Intelligence
V - Verbal Aptitude
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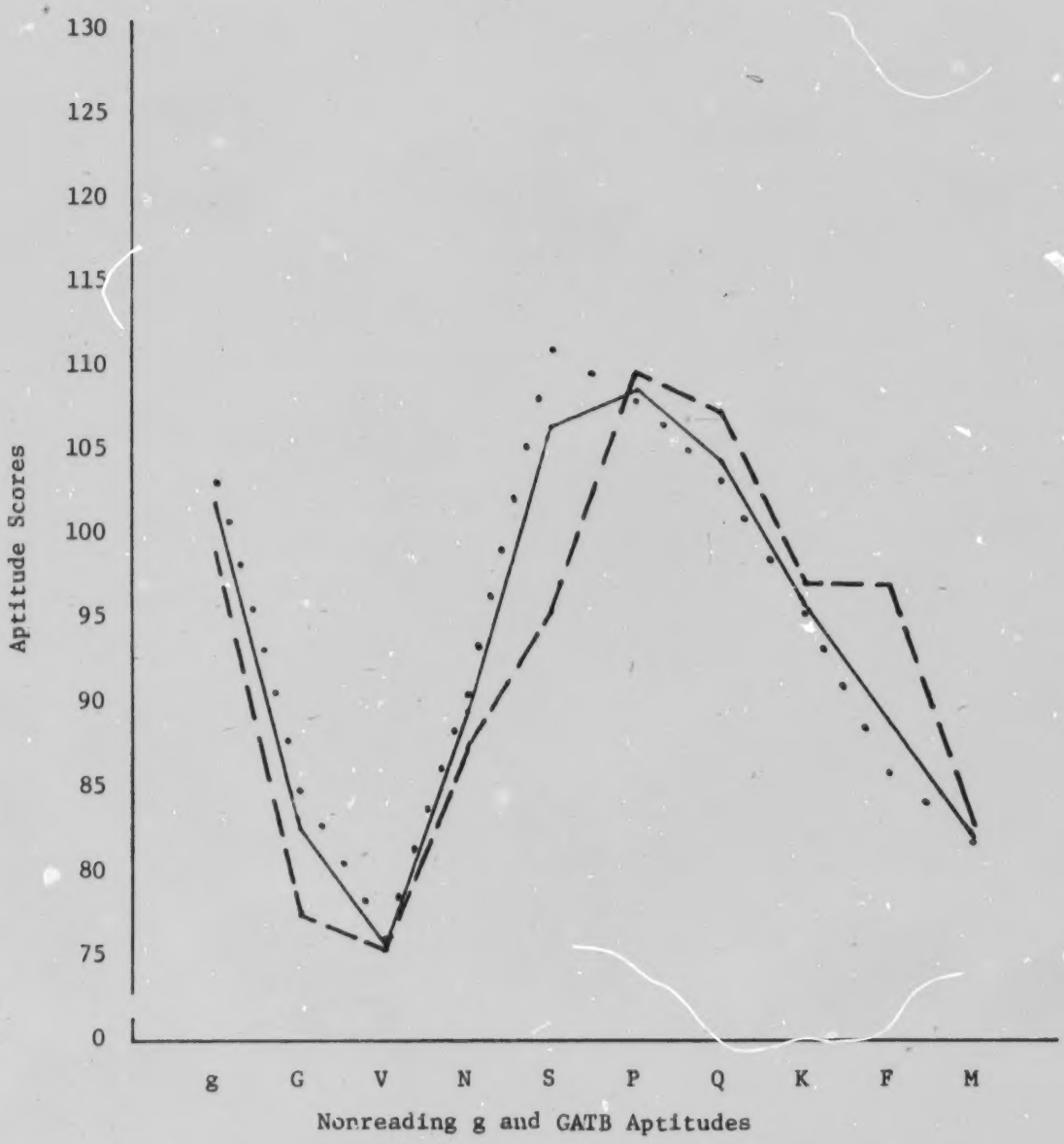
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Figure 17

Former Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for Delgado Total, Female and Male Deaf Populations

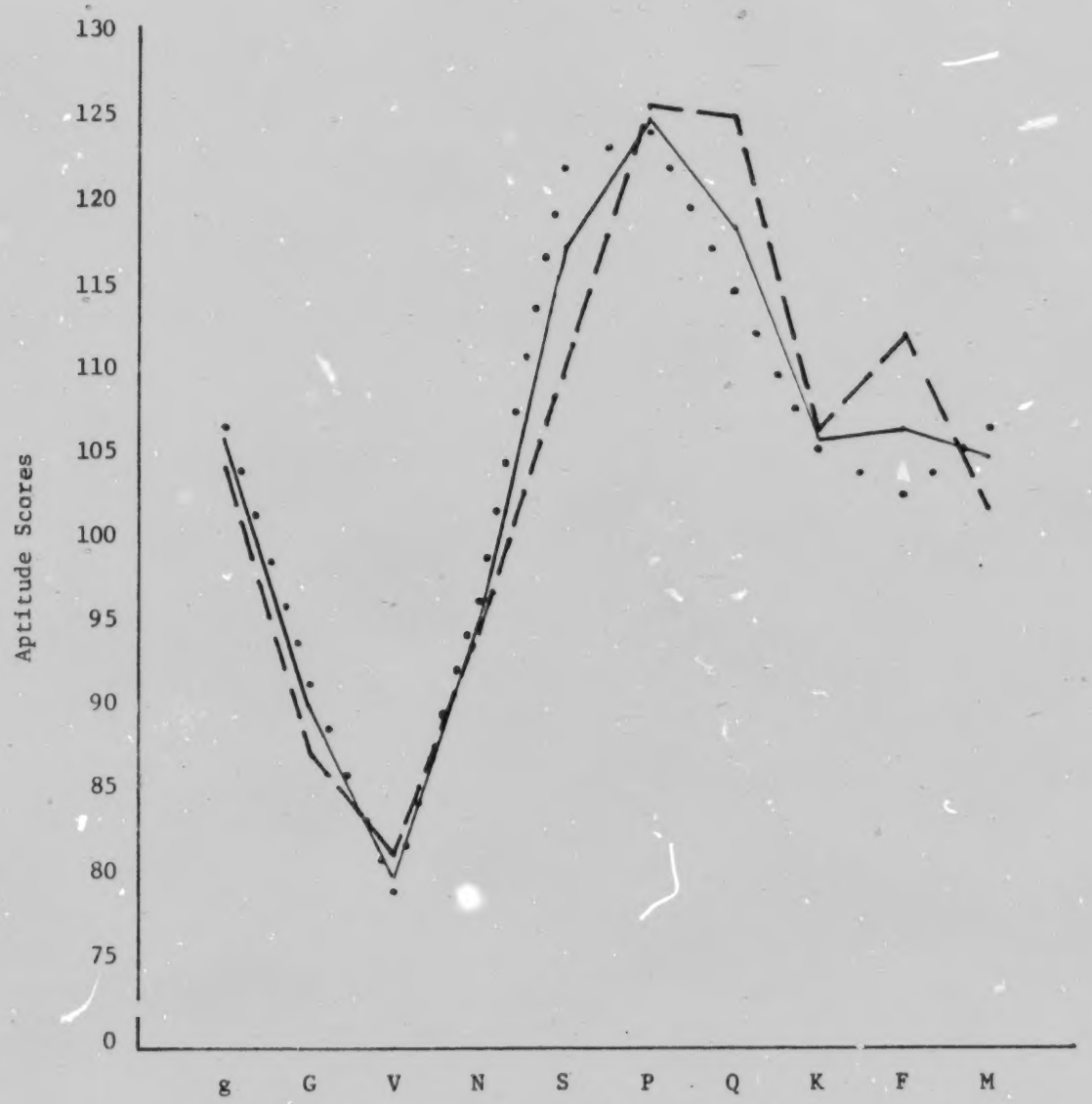


—— Delgado Total Deaf Population ("g" - [N=108], GATB - [N=108])
— — Delgado Female Deaf Population ("g" - [N=32], GATB - [N=32])
. . . Delgado Male Deaf Population ("g" - [N=76], GATB - [N=76])

g - Nonreading Measure of General Intelligence
G - Reading Measure of General Intelligence
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Figure 18

Former Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for Seattle Total, Female and Male Deaf Populations

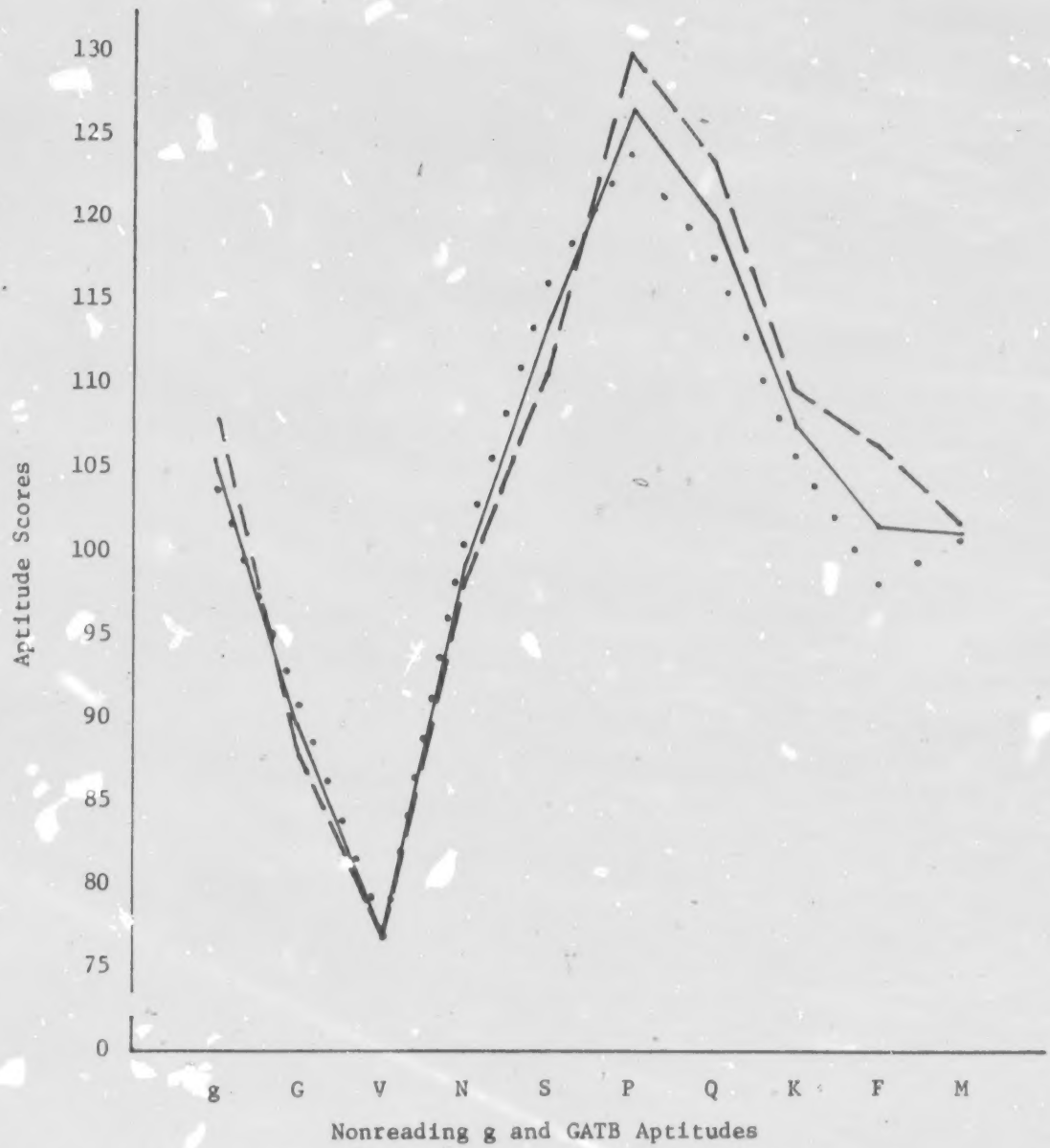


——— Seattle Total Deaf Population ("g" - [N=97], GATB - [N=103])
— — Seattle Female Deaf Population ("g" - [N=37], GATB - [N=38])
. . . Seattle Male Deaf Population ("g" - [N=60], GATB - [N=65])

g - Nonreading Measure of General Intelligence
G - Reading Measure of General Intelligence
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Figure 19

Former Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for TVI Total, Female and Male Deaf Populations



——— TVI Total Deaf Population ("g" - [N=92], GATB - [N=165])
— — — TVI Female Deaf Population ("g" - [N=36], GATB - [N=72])
· · · TVI Male Deaf Population ("g" - [N=56], GATB - [N=93])

g - Nonreading Measure of General Intelligence
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N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Table 11

Former Student Data: Means of Nonreading "g" and GATB Aptitude Scores by School and Sex

SCHOOL	SEX		NON-READ "g"	General Aptitude Test Battery (GATB)								
				G	V	N	S	P	Q	K	F	M
DELGADO	F	$\bar{X}$	99.1	77.6	75.5	87.1	95.7	110.1	107.8	97.4	97.3	82.9
		N	32	—								→
	M	$\bar{X}$	103.5	85.0	76.0	90.9	111.3	108.4	103.6	95.7	86.1	81.9
		N	76	—								→
	TOT	$\bar{X}$	102.2	82.8	75.9	89.8	106.7	108.9	104.8	96.2	89.4	82.2
		N	108	—								→
SEATTLE	F	$\bar{X}$	104.6	87.6	81.5	94.7	110.0	126.1	125.5	106.9	113.5	102.1
		N	37	38	—							→
	M	$\bar{X}$	107.1	91.8	79.2	96.5	122.5	124.8	115.0	105.6	102.9	106.9
		N	60	65	—							→
	TOT	$\bar{X}$	106.1	90.2	80.1	95.8	117.9	125.3	118.9	106.1	106.8	105.1
		N	97	103	—							→
TVI	F	$\bar{X}$	108.1	88.0	76.9	98.0	111.1	130.4	123.9	110.1	106.7	101.9
		N	36	72	—					→	68	69
	M	$\bar{X}$	104.2	91.0	77.0	100.4	116.5	124.4	118.0	106.1	98.3	101.2
		N	56	93	—					→	90	90
	TOT	$\bar{X}$	105.7	89.7	77.0	99.3	114.1	127.0	120.5	107.9	101.9	101.5
		N	92	165	165	165	165	165	165	165	158	159
TOTAL	F	$\bar{X}$	104.1	85.5	77.9	94.7	107.3	124.6	120.7	106.4	106.4	97.6
		N	105	142	—					→	138	139
	M	$\bar{X}$	104.8	89.3	77.3	96.2	116.5	119.3	112.4	102.6	95.6	96.5
		N	192	234	—					→	231	231
	TOT	$\bar{X}$	104.6	87.9	77.5	95.6	113.0	121.3	115.6	104.0	99.6	96.9
		N	297	376	—					→	369	370

2. Current Student Data: Nonreading "g" and GATB (Figs. 20-24).

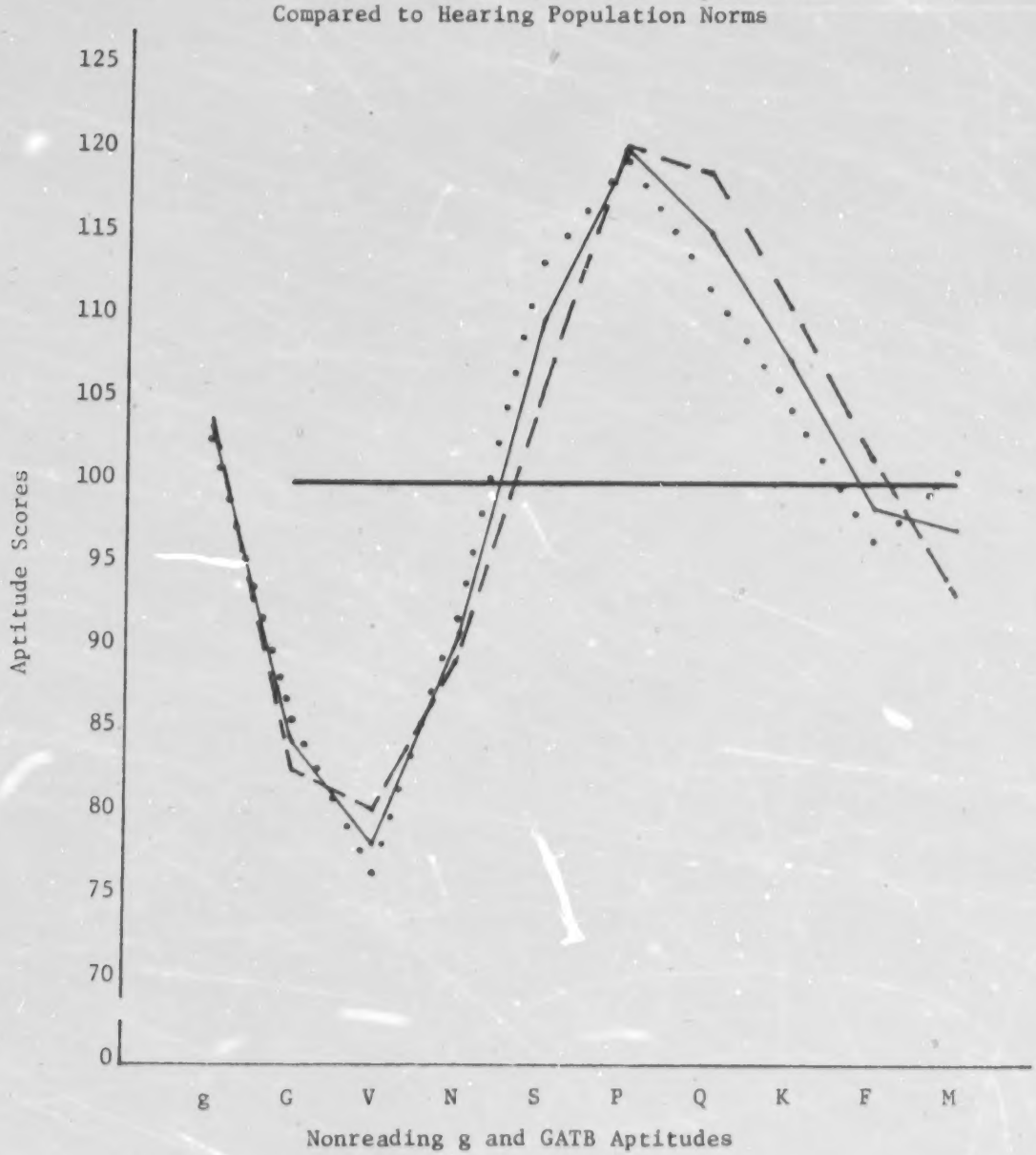
The plotted graphs illustrated in this figure set are congruent to those in the former student figure set. Once again, depressed scores were obtained on aptitude measures that were verbal in nature, and average or above average scores were obtained on nonverbal aptitude measures. T tests computed for differences between former student and current student sample means indicated no significant differences on all GATB aptitude measures and the Nonreading Measure of General Intelligence.

Figure 20 illustrates the aptitude profiles of the Total Female and Total Male samples. An analysis of variance for differences between sexes revealed, contrary to ANOVA on the former student sample, no significant differences on all aptitude measures. However, significant differences were found between schools on Aptitudes N ($F = 5.18$, $df = 83$, $p < .01$) and M ($F = 4.15$, $df = 83$, $p < .025$). T tests for differences between school pairs indicated that Delgado was significantly lower than TVI on Aptitude N ($t = 3.39$, $p < .01$) and Seattle was significantly higher than Delgado on Aptitude M ($t = 2.47$, $p < .02$). The standard deviation on Aptitude M for the Seattle sample equaled 32, 12 points greater than the norm of 20. For a graphic comparison of school profiles, refer to Figure 21.

Figures 22, 23 and 24 illustrate the male and female profiles within Delgado, Seattle and TVI, respectively. Figures 22 and 24 (Delgado and TVI) of the current student sample are congruent to the configurations of the graphs in Figures 17 and 19 (former student sample). However, Figure 23, which includes profiles of the Total, Female and Male Deaf Populations at Seattle, differs from Figure 18 in that Aptitude F is 12.2 points lower. This difference is significant ($t = 2.41$, $p < .02$).

Figure 20

Current Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for Total, Female, and Male Deaf Populations Compared to Hearing Population Norms



——— Total Deaf Population ("g" - [N=62], GATB - [N=84])
— — Female Deaf Population ("g" - [N=30], GATB - [N=40])
• • • Male Deaf Population ("g" - [N=32], GATB - [N=44])
——— Hearing Population Norms (N=4,000)

g - Nonreading Measure of General Intelligence
G - Reading Measure of General Intelligence
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
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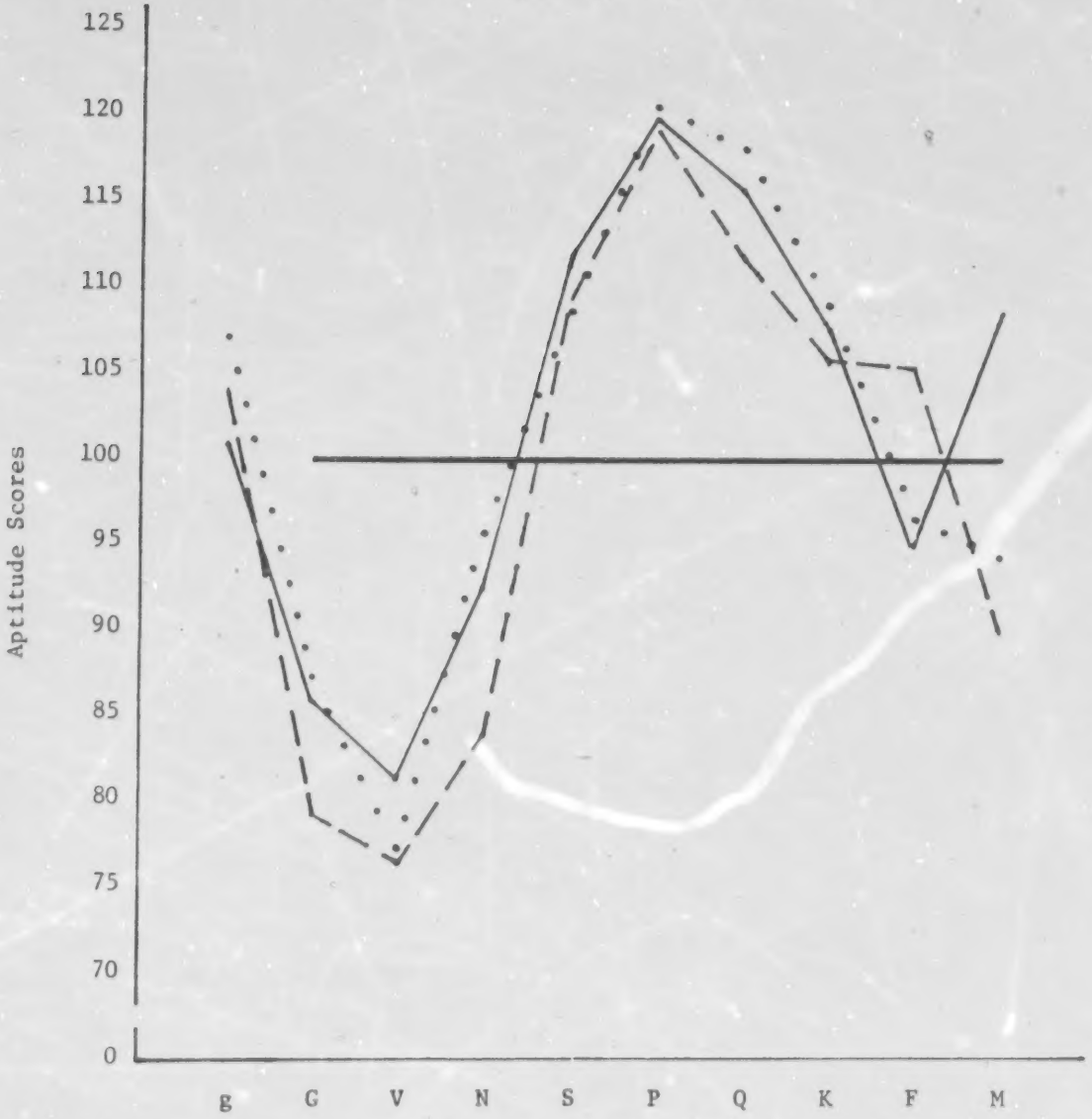
Figure 21

Current Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for Delgado, Seattle and TVI Deaf Populations Compared to Hearing Population Norms

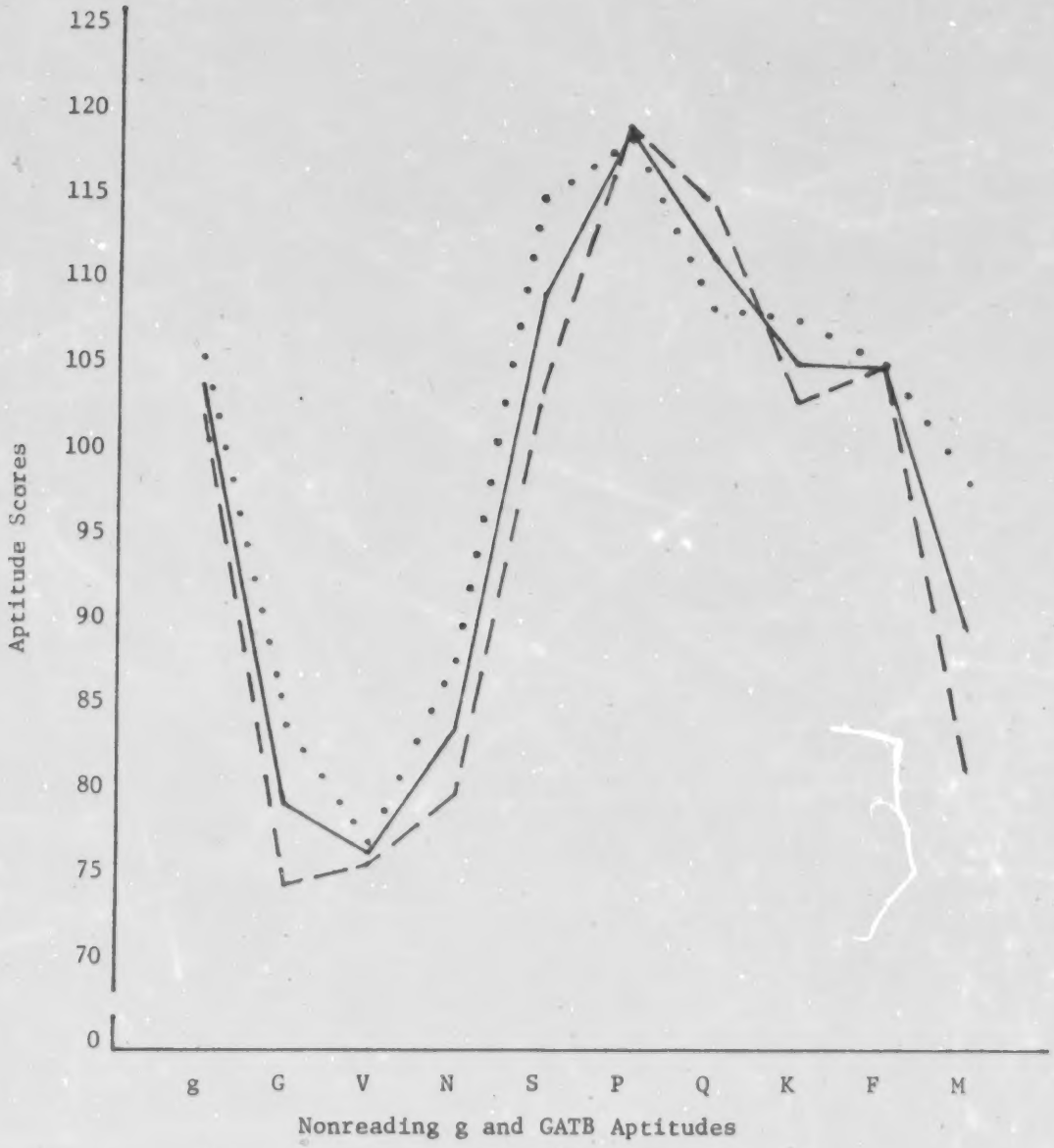


— — Total Delgado Deaf Population ("g" - [N=28], GATB - [N=28])
——— Total Seattle Deaf Population ("g" - [N=25], GATB - [N=26])
• • • Total TVI Deaf Population ("g" - [N=9], GATB - [N=30])
——— Hearing Population Norms (N=4,000)

g - Nonreading Measure of General Intelligence
G - Reading Measure of General Intelligence
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Figure 22

Current Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for Delgado Total, Female and Male Deaf Populations

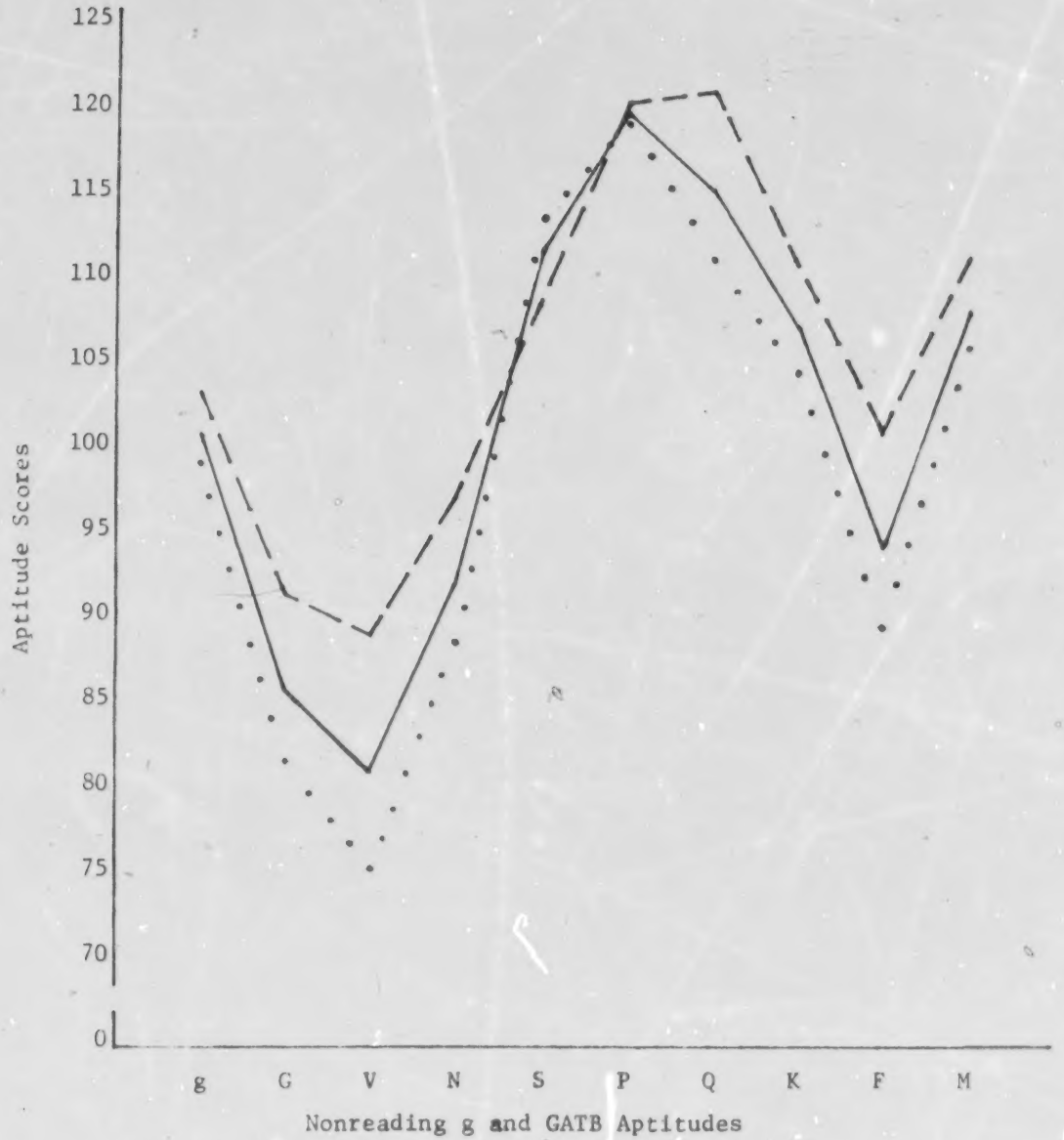


——— Delgado Total Deaf Population (N=28)
— — Delgado Female Deaf Population (N=14)
. . . Delgado Male Deaf Population (N=14)

g - Nonreading Measure of General Intelligence
G - Reading Measure of General Intelligence
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Figure 23

Current Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores For Seattle Total, Female and Male Deaf Populations

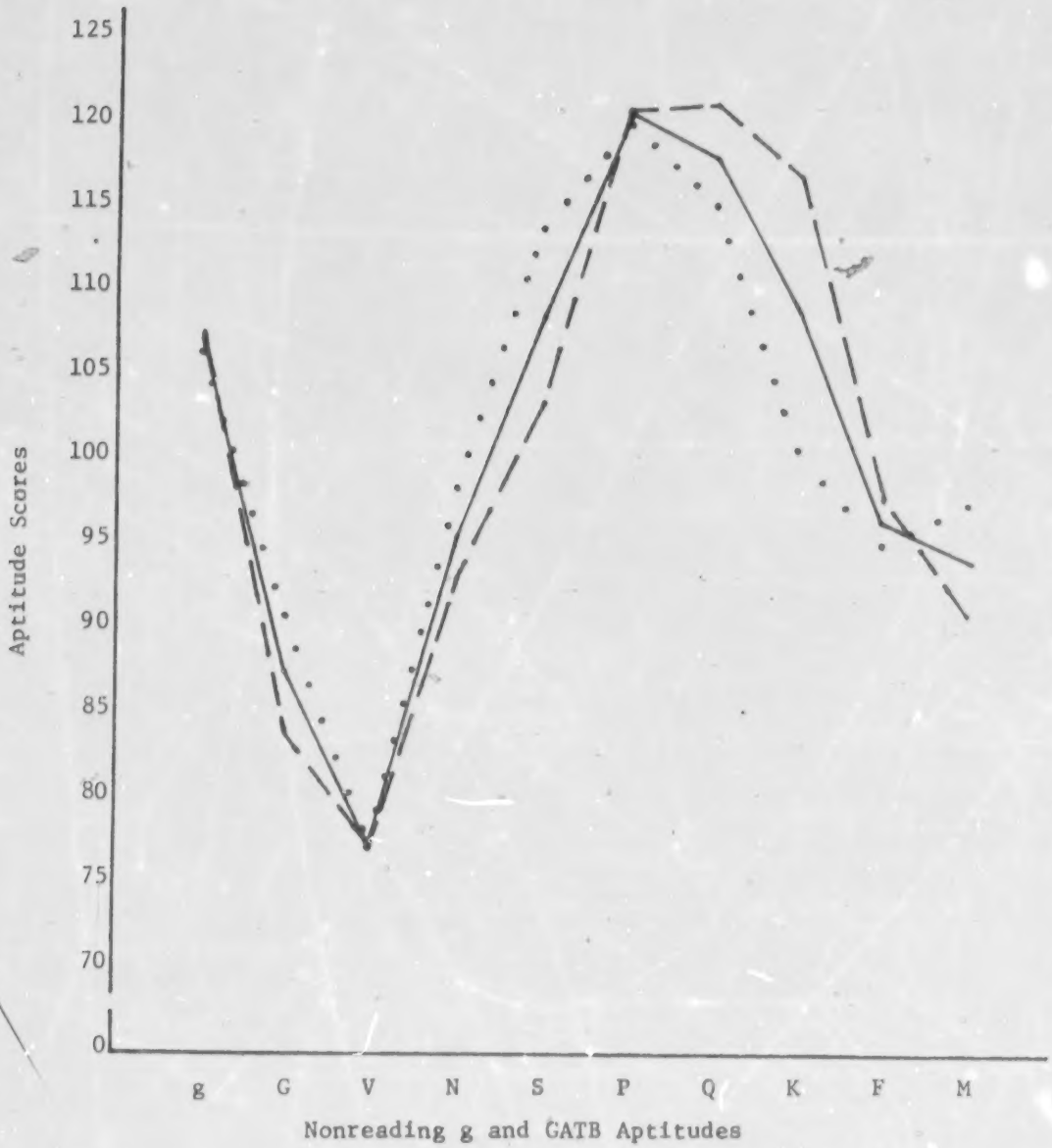


——— Seattle Total Deaf Population ("g" - [N=25, GATB - [N=26])
— — — Seattle Female Deaf Population ("g" - [N=10], GATB - [N=11])
. . . Seattle Male Deaf Population ("g" - [N=15], GATB - [N=15])

g - Nonreading Measure of General Intelligence
G - Reading Measure of General Intelligence
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Figure 24

Current Student Data: Means of the Nonreading Measure of General Intelligence and GATB, B-1002, Aptitude Scores for TVI Total, Female and Male Deaf Populations



——— TVI Total Deaf Population ("g" - [N=9], GATB - [N=30])
— — TVI Female Deaf Population ("g" - [N=6], GATB - [N=15)
. . . TVI Male Deaf Population ("g" - [N=3], GATB - [N=15])

g - Nonreading Measure of General Intelligence
C - Reading Measure of General Intelligence
V - Verbal Aptitude
N - Numerical Aptitude
S - Spatial Aptitude
P - Form Perception
Q - Clerical Perception
K - Motor Coordination
F - Finger Dexterity
M - Manual Dexterity

Table 12

Current Student Data: Means of Nonreading "g" and GATB Aptitude Scores by School and Sex

SCHOOL	SEX		NON-READ "G"	General Aptitude Test Battery (GATB)								
				G	V	N	S	P	Q	K	F	M
DELGADO	F	$\bar{X}$	102.4	74.6	75.9	80.0	103.8	119.6	114.9	103.2	105.6	81.4
		N	14	→								→
	M	$\bar{X}$	105.9	84.0	76.9	87.9	115.4	119.1	108.9	108.0	105.3	98.5
		N	14	→								→
	TOT	$\bar{X}$	104.1	79.3	76.4	83.9	109.6	119.4	111.9	105.6	105.4	89.9
		N	28	→								→
SEATTLE	F	$\bar{X}$	103.5	91.5	89.2	97.3	109.1	120.8	121.3	111.2	101.1	111.6
		N	10	11	→							→
	M	$\bar{X}$	99.5	81.9	75.3	88.9	114.0	119.8	111.6	104.9	89.9	106.3
		N	15	→								→
	TOT	$\bar{X}$	101.1	86.0	81.2	92.5	111.9	120.2	115.7	10[illegible].5	94.6	108.5
		N	25	26	→							→
TVI	F	$\bar{X}$	107.5	83.9	77.5	93.0	103.5	121.1	121.3	117.2	97.8	91.0
		N	6	15	→							→
	M	$\bar{X}$	106.7	90.9	77.1	98.5	114.0	120.3	115.3	100.9	95.1	97.6
		N	3	15	→							→
	TOT	$\bar{X}$	107.2	87.4	77.3	95.7	108.8	120.7	118.3	109.0	96.5	94.3
		N	9	30	→							→
TOTAL	F	$\bar{X}$	103.8	82.7	80.1	89.6	105.2	120.5	119.1	110.7	101.4	93.3
		N	30	40	→							→
	M	$\bar{X}$	102.9	85.7	76.4	91.8	114.4	119.8	112.0	104.5	96.6	100.8
		N	32	44	→							→
	TOT	$\bar{X}$	103.3	84.3	78.2	90.8	110.0	120.1	115.4	107.4	98.9	97.3
		N	62	84	→							→

THE WECHSLER ADULT INTELLIGENCE SCALE: PERFORMANCE

The Wechsler Adult Intelligence Scale (WAIS) is an outgrowth of the Wechsler Bellevue Intelligence Scale. It is regarded as the best of adult individual tests of intelligence and has become the standard against which other adult tests are compared (Burstein, 1972). Vernon and Brown (1964) state the following: "The Wechsler Performance Scale is at present the best test for deaf adults, ages 16-70 years. It yields a relatively valid IQ score, and offers opportunities for qualitative interpretation of factors such as brain injury or emotional disturbance. It has good interest appeal and is relatively easy to administer and reasonable in cost."(p. 416)

Consisting of individual rather than group tests, the Wechsler scales help the examiner gain deeper insight into the subject's work habits, ability to learn and approach to a new situation. In his review of Joseph D. Matarazzo's book, Wechsler's Measurement and Appraisal of Adult Intelligence, Bouchard (1974) comments that the only kind of intellectual assessment that should be made in conjunction with making important life decisions is via individual intelligence testing with an instrument such as the WAIS.

A. Test Description

The WAIS consists of 12 tests which are divided into two subgroups, verbal and performance. Since an IQ test must be a non verbal performance type instrument to be a valid measure of the intelligence of a deaf individual (Burchard and Myklebust, 1942; Lane and Schneider,

1941), only the five regular performance measures were administered to the population under investigation. The sixth performance subtest, Cube Analysis, is optional and was not used in this battery.

These measures are:

1. Digit Symbol (DS) -- The Digit Symbol or Substitution test requires that the examinee associate certain symbols with certain other symbols. The speed and accuracy with which the subject accomplishes this task serve as a measure of his intellectual ability.

2. Picture Completion (PC) -- The Picture Completion subtest of the WAIS requires that the subject discover and name the missing part of each of 21 incompletely drawn pictures. The test measures the individual's basic conceptual and perceptual abilities in so far as they are involved in the visual recognition and identification of common objects and scenes.

3. Block Design (BD) -- Originated by Kos, the Block Design test is a comprehensive measure of non verbal intelligence. Here, the task for the examinee is to reconstruct red and white graphic designs displayed on two-dimensional cards through manipulation of blocks whose sides are painted either (1) red, or (2) white, or (3) 1/2 red and 1/2 white. The test correlates very highly with all measures of general intelligence ($r = +.7$ or greater).

4. Picture Arrangement (PA) -- The test materials for the Picture Arrangement subtest of the WAIS consist of 8 sets of pictures. When sequenced properly, each picture series relates a story. This test, according to its author, effectively measures an individual's ability to comprehend and size up a total situation.

5. Object Assembly (OA) -- In the object assembly subtest, the subject is asked to assemble components to construct a common object, in similar fashion to solving a jigsaw puzzle. This WAIS subtest consists of four such figure form boards: a manikin, a feature profile, a hand, and an elephant. The subject's mode of perception, the degree to which he relies on trial and error and his manner of reacting to mistakes are often revealed in this test; it is for these reasons that the Object Assembly test is considered to be of particular clinical value.

B. Test Limitations and Qualifications

Wechsler operationally defines intelligence as the "aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment" (Wechsler, 1958, p. 7). He states, further, that intelligence can be measured by way of abilities in that we are not concerned with the abilities themselves, but rather with what enters into or emerges from them. He conceives intelligence as involving the ability to perceive logical relations and to use symbols along with the ability to handle practical situations. Thus, Wechsler constructed the WAIS to include six verbal and six non verbal or performance tests. While intending to emphasize the dichotomy between these types of abilities, the grouping of subtests into verbal and performance categories does not imply that these are measures of different kinds of intelligence, but rather that these are different ways in which intelligence may manifest itself.

It is probable that administration of the non verbal subtests and exclusion of the verbal tests would yield only partial information regarding one's intelligence. It appears that each subtest provides unique "intelligence information" and that exclusion of one without comparable substitution would reduce the power of a measure which is based upon a wholistic conceptualization of intelligence. Unfortunately, the subtests of the WAIS verbal scale have neither been substituted for by other measures nor formally adapted for administration to a hearing-impaired population. A need for development and

adaptation of such tests is indicated.

For a delineation of the limitations and qualifications of each subtest, please refer to Chapter 5, "Selection and description of tests," in Wechsler's The Measurement and Appraisal of Adult Intelligence (1958).

C. Methods and Procedures

The Wechsler Performance Scale was individually administered to each new program entry. The examiners at the Seattle and TVI programs were, respectively, the program administrator and a school counselor of whom both were proficient in Total Communication and were qualified to administer the WAIS; both individuals communicated instructions for each of the five performance tests via Total Communication and then demonstrated each task. The Delgado program, on the other hand, employed the services of an outside examiner who was not proficient in communicating with the deaf; test instructions were neither given manually nor was an interpreter used. Each task was described verbally and demonstrated. In addition, the outside examiner did not administer one of the five performance tests, the picture completion subtest. The stated reason for exclusion of this test from the performance battery was that many of the deaf students in the program came from oral schools and could not understand the subtest and that there was no way to communicate.

All tests were scored by the individual who administered them. Delgado's outsider examiner computed a full scale estimate of the Performance IQ for each individual by prorating the missing score in each case. The prorated missing score and, therefore, the total Performance score and the Performance IQ were not included in the present analysis of data because they were estimates and not actual scores.

Former student data were compiled by each of the programs and sent to the researchers for analysis. Current student data were collected out of student file originals by the current research component.

1. Former Student WAIS Performance Data. Table 13 illustrates the distribution of students to whom the WAIS Performance Scale was administered, by sex and by school.

Table 13

WAIS Performance Scale: Former Student Data Set

School	Female	Male	Total
Delgado Junior College	26	45	71*
Seattle Community College	40	69	109**
Technical Vocational Institute	53	71	124***
Totals	119	185	304

*PC, Total and PIQ scores are missing on each individual in the Delgado population
**Only the PIQ score was available on 6 individuals
***Only the PIQ score was available on 10 individuals

2. Current Student WAIS Performance Data. These include data on a sample of students who entered the programs in the Spring 1972 through Spring 1973 semesters (quarters). Table 14 indicates the number of students, by sex and by school, on whom WAIS data were collected.

Table 14

WAIS Performance Scale: Current Student Data Set

School	Female	Male	Total
Delgado Junior College	14	14	28*
Seattle Community College	11	15	26
Technical Vocational Institute	14	14	28
Totals	39	43	82

*PC, Total and PIQ scores are missing on each individual in the Delgado population

NOTE: The Delgado program was requested to supply PC scores on individuals currently in the program however, as of the date of this writing, Nov. 1974, no data have been received.

D. Results

Using the Wechsler Table of Scaled Score Equivalents, raw scores were converted to scaled scores for each subject in this study. The former student intelligence profiles are illustrated in Figures 25 through 29 and the current student profiles in Figures 30-34. In these Figures, scaled scores appear on the vertical axis and Performance subtests appear on the horizontal axis. Tables 15 and 16 consist of WAIS Performance subtest

means, calculated to the nearest hundredth, for each of the above-mentioned figure sets, respectively. These tables also give the PIQ scores of the population under study by school and by sex.

1. Former Student Data: WAIS Performance (Figs. 25-29).

Figure 25 illustrates the intelligence profile of the hearing impaired students entering the model programs. The students scored above the mean scaled score of 10 (standard deviation 3). of the standardization sample on all five performance measures. High mean scores were obtained on the Block Design and Object Assembly tests by both Males and Females in the sample; lower mean scores were obtained on the Picture Completion and Picture Arrangement subtests. The only difference between the male and female profiles was indicated on the fifth performance measure, the Digit Symbol subtest. Females scored significantly higher than males on this test (ANOVA: $F = 14.22$, $df = 287$ $p < .001$). Although there were no other configurational anomalies between male and female profiles, significant differences in performance levels were found on the Picture Completion (PC) and Block Design (BD) tests; in both cases, Males scored significantly higher than Females (PC - $F = 10.7$, $df = 216$, $p < .005$; BD - $F = 16.01$, $df = 287$, $p < .001$). Males attained an average performance IQ of 112.2 and Females 110.3 (See Table 8). This difference was not significant.

A comparison of school profiles is presented in Figure 26. Analyses of variance indicated significant differences between

schools on the Digit Symbol ($F = 4.34$, $df = 287$, $p < .025$), Block Design ($F = 17.04$, $df = 287$, $p < .001$), Picture Arrangement ($F = 6.47$, $df = 287$, $p < .005$) and Object Assembly ($F = 6.6$, $df = 287$, $p < .005$) tests. T tests computed for differences between school pairs indicated the following:

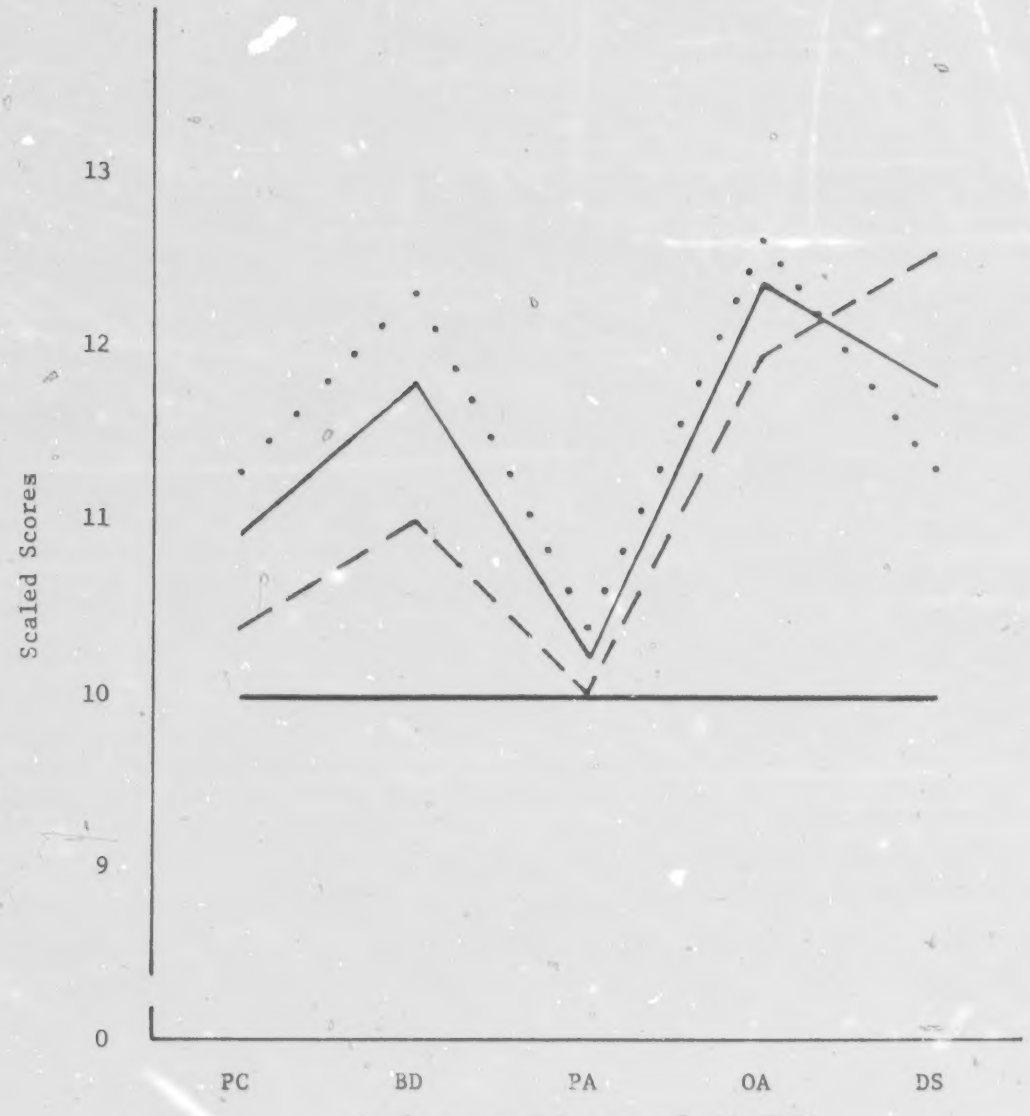
(a) The TVI sample scored significantly higher on the DS test than the Delgado ($t = 2.33$, $p < .05$) and Seattle ($t = 2.56$, $p < .02$) samples;
(b) The Delgado sample scored significantly lower on the BD test than the Seattle ($t = 4.82$, $p < .001$) and TVI ($t = 5.32$, $p < .001$) samples;
(c) The Delgado sample scored significantly lower on the PA test than the Seattle ($t = 3.19$, $p < .01$) and TVI ($t = 2.97$, $p < .01$) samples;
(d) The Delgado sample scored significantly lower on the OA test than the Seattle ($t = 2.87$, $p < .01$) and TVI ($t = 3.35$, $p < .01$) samples.

School differences were not significant on the PC test and the Performance IQ score (Delgado -- not available; Seattle -- 111.1; TVI -- 111.7).

Figures 27, 28 and 29 illustrate the sex profile differences within the Delgado, Seattle and TVI samples, respectively. The TVI and Seattle profiles, are, for the most part, congruent to those in Figure 25. However, the Delgado profiles not only indicate relatively depressed scores (with the exception of DS), but also indicate larger differences in performance levels between males and females on all but the DS measure. These anomalies may be attributable to the method of test administration (This point is treated more fully in the Discussion section).

Figure 25

Former Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores for Total, Female and Male Deaf Populations Compared to Hearing Population Norms

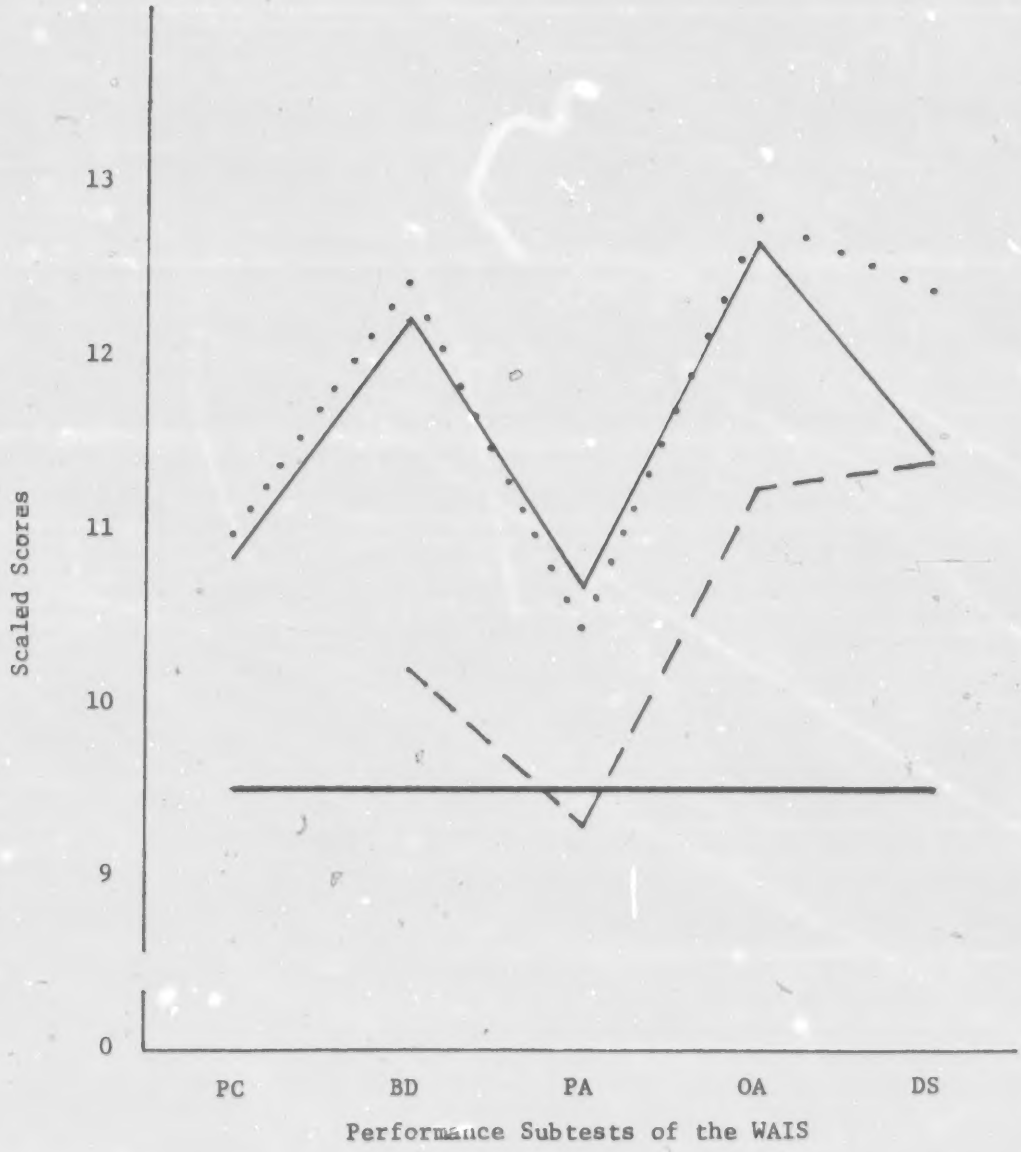


——— Total Deaf Population (BD,PA,DA,DS -[N=288], PC - [N=217])
— — Female Deaf Population (BD,PA,DA,DS -[N=113], PC - [N=87])
. . . Male Deaf Population (BD,PA,DA,DS -[N=175], PC - [N=130])
——— Hearing Population

DS - Digit Symbol
PC - Picture Completion
BD - Block Design
PA - Picture Arrangement
OA - Object Assembly

Figure 26

Former Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores for Delgado, Seattle and TVI Deaf Populations Compared to Hearing Population Norms

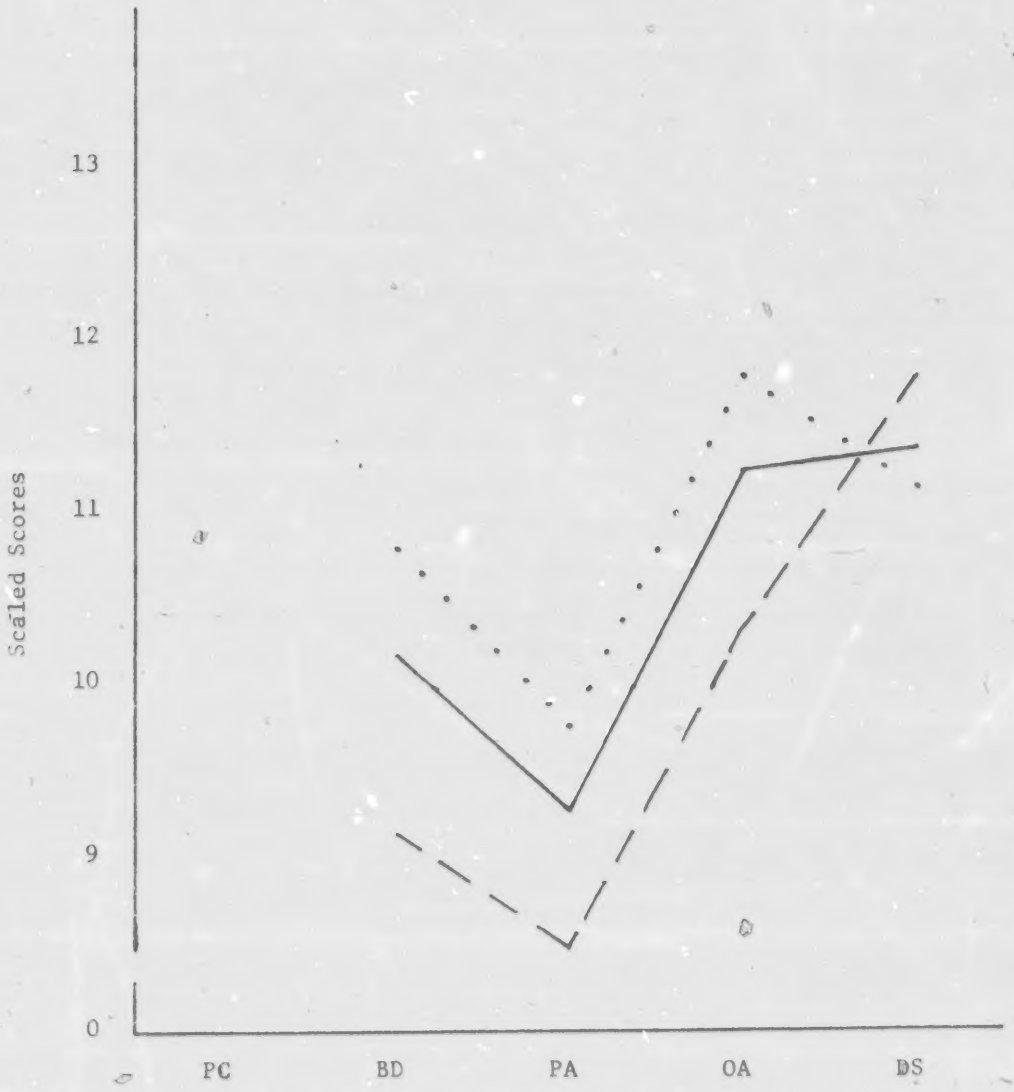


— — Total Delgado Deaf Population (N=71 PC score are missing)
——— Total Seattle Deaf Population (N=103)
. . . Total TVI Deaf Population (N=114)
▬▬ Hearing Population Norms

PA - Picture Arrangement
PC - Picture Completion
BD - Block Design
OA - Object Assembly
DS - Digit Symbol

Figure 27

Former Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores for Delgado Total, Female, and Male Deaf Populations

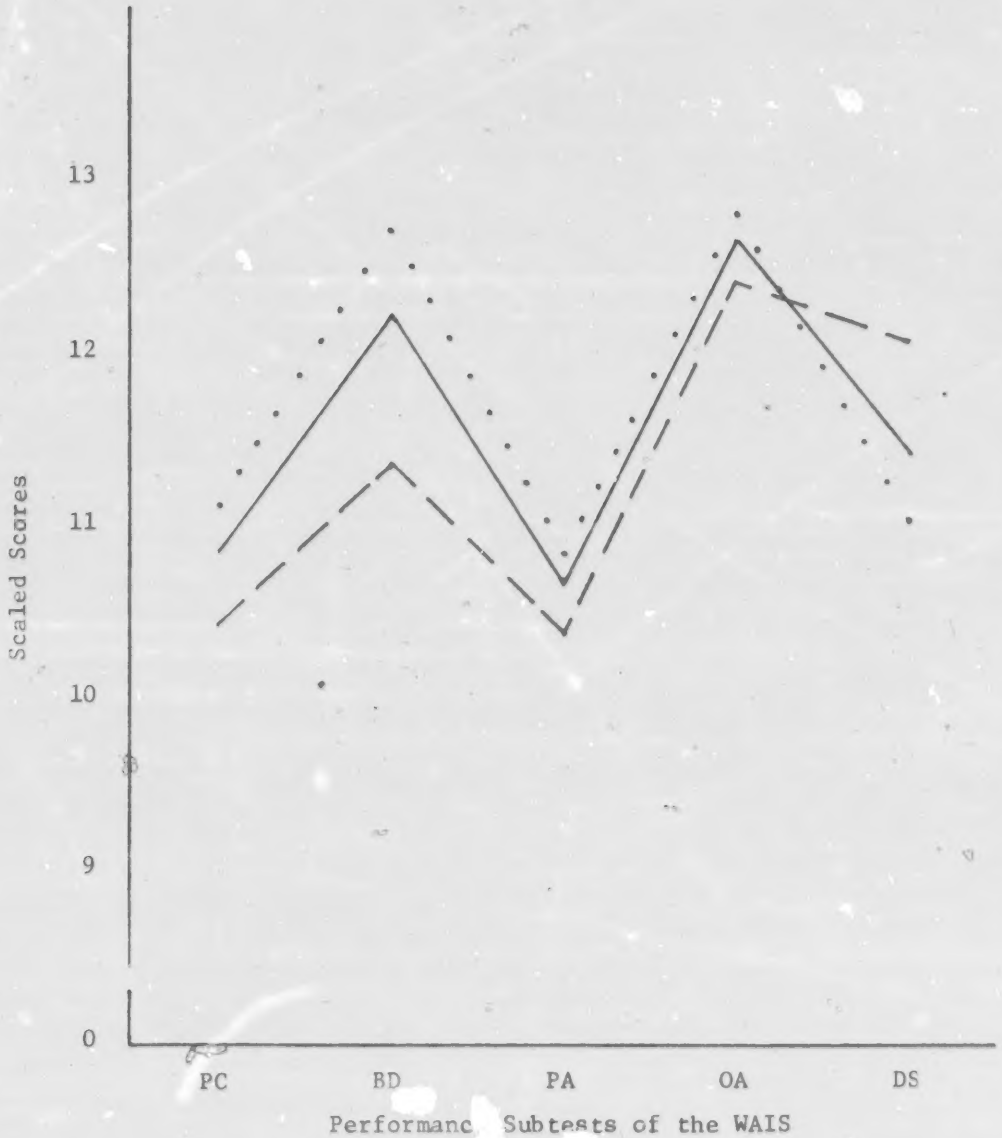


——— Delgado Total Deaf Population (N=71, PC scores are missing)
— — — Delgado Female Deaf Population (N=26, PC scores are missing)
. . . Delgado Male Deaf Population (N=45, PC scores are missing)

PC - Picture Completion
BD - Block Design
PA - Picture Arrangement
OA - Object Assemble
DS - Digit Symbol

Figure 28

Former Student Data: Means of the Wechlser Adult Intelligence Performance Scale Subtest Scores for Seattle Total, Female, and Male Deaf Populations

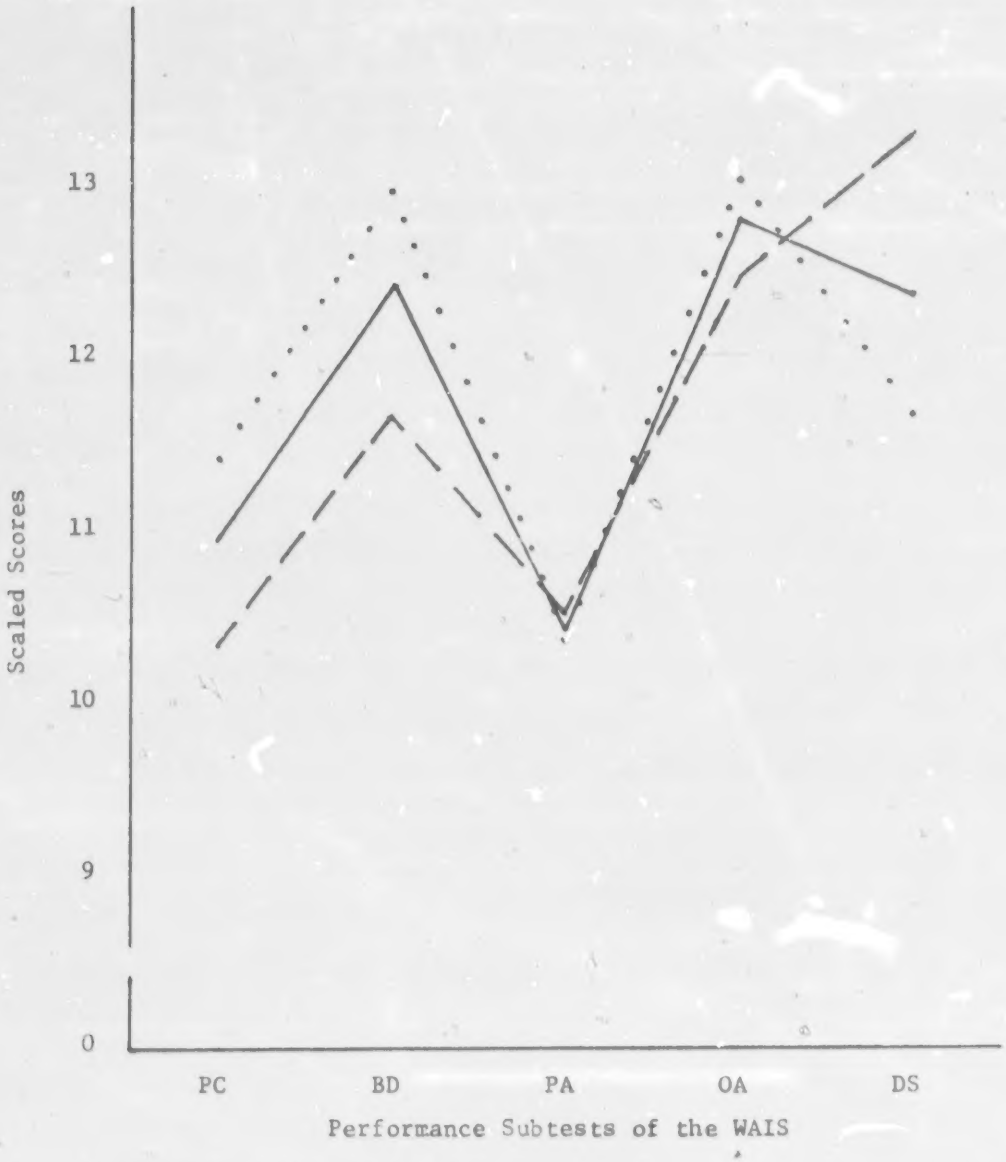


——— Seattle Total Deaf Population (N=103)
— — Seattle Female Deaf Population (N=38)
. . . Seattle Male Deaf Population (N=65)

PC - Picture Completion
BD - Block Design
PA - Picture Arrangement
OA - Object Assemble
DS - Digit Symbol

Figure 29

Former Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores for TVI Total, Female, and Male Deaf Populations



TVI Total Deaf Population (N=114)
TVI Female Deaf Population (N=49)
TVI Male Deaf Population (N=65)

PC - Picture Compeltion
BD - Block Design
PA - Picture Arrangement
OA - Object Assemble
DS - Digit Symbol

Table 15

Former Student Data: Means of WAIS
Subtest Scores and Performance IQ's by School and Sex

SCHOOL	SEX		Wechsler Adult Intelligence Scale					
			PC	BD	PA	OA	DS	PIQ
DELGADO	F	$\bar{X}$		9.15	8.46	10.31	11.81	
		N		26	→	→	→	
	M	$\bar{X}$		10.82	9.78	11.82	11.18	
		N		45	→	→	→	
	TOT	$\bar{X}$		10.21	9.30	11.27	11.41	
		N		71	→	→	→	
SEATTLE	F	$\bar{X}$	10.45	11.37	10.40	12.45	12.11	110.0
		N	38	→	→	→	→	40
	M	$\bar{X}$	11.14	12.74	10.86	12.83	11.08	111.8
		N	65	→	→	→	→	69
	TOT	$\bar{X}$	10.88	12.23	10.69	12.69	11.46	111.1
		N	103	→	→	→	→	109
TVI	F	$\bar{X}$	10.37	11.71	10.55	12.51	13.35	110.5
		N	49	→	→	→	→	53
	M	$\bar{X}$	11.46	13.00	10.40	13.08	11.71	112.5
		N	65	→	→	→	→	71
	TOT	$\bar{X}$	10.99	12.45	10.47	12.83	12.41	111.7
		N	114	→	→	→	→	124
TOTAL	F	$\bar{X}$	10.40	11.01	10.02	11.98	12.58	110.1
		N	87	113	→	→	→	93
	M	$\bar{X}$	11.30	12.34	10.41	12.66	11.34	112.2
		N	130	175	→	→	→	140
	TOT	$\bar{X}$	10.94	11.82	10.26	12.40	11.82	111.4
		N	217	288	→	→	→	233

2. Current Student Data: WAIS Performance (Figs. 30-34).

The plotted graphs illustrated in Figure 30 are congruent to those in Figure 25. Once again, highest scores were obtained on the BD, OA and DS subtests and relatively lower scores were obtained on the PC and PA subtests. T tests computed for differences between total former and total current student sample means indicated no significant differences on all Performance subtests and the Performance IQ.

Analysis of variance for differences between sexes revealed: (a) Females obtained significantly higher scores on the DS test than Males ($F = 6.79$, $df = 81$, $p < .025$). This result is consistent with the former student data analysis; (b) Males obtained significantly higher scores than Females on the PC test ($F = 4.75$, $df = 53$, $p < .05$). This result is also consistent with the former student data analysis; (c) No significant differences were found on the remaining measure. This result is contrary to the former student data analysis, which indicated significant differences between sexes on the BD variable at the .001 level; and (d) Males obtained an average Performance IQ of 108.0 and Females 108.1 (See Table 10). This difference was not significant.

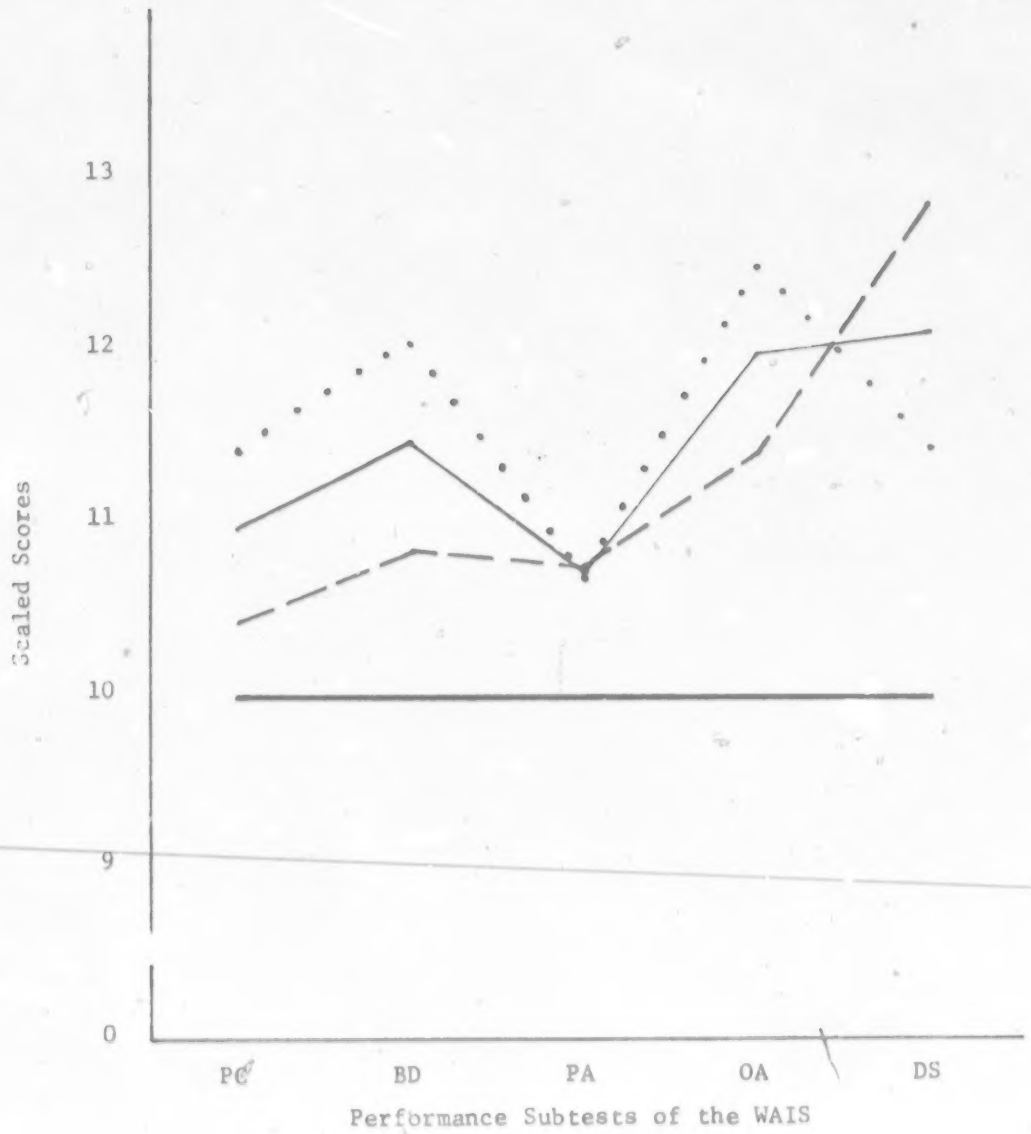
School profiles are compared in Figure 31. Profile observation indicates that the Delgado configuration is anomalous; in the Seattle and TVI profiles, the PA test is the most depressed of the subtest scores -- this is not true in Delgado's case. Analysis of variance indicated a significant difference between

schools on this measure only (PA: $F = 6.19$, $df = 81$, p .005). T tests computed for differences between school pairs revealed that the Delgado sample obtained a significantly higher mean than the Seattle ($t = 2.77$, $p < .01$) and the TVI ($t = 3.11$, $p < .01$) samples on the PA subtest. Further investigation showed that the Delgado current student PA mean was significantly higher than the Delgado former student PA mean for both males and females ($t = 3.09$, $p < .01$; $t = 3.30$, $p < .01$, respectively). Test administration difficulties or inconsistencies may account for these incongruities.

Figures 32, 33, and 34 illustrate the within school sex profiles. With the exception of the Delgado figure (#32), these are congruent, for the most part, to Figure 30 (Note -- minor incongruities may be attributable to the smallness of sample size in the current student data set).

Figure 30

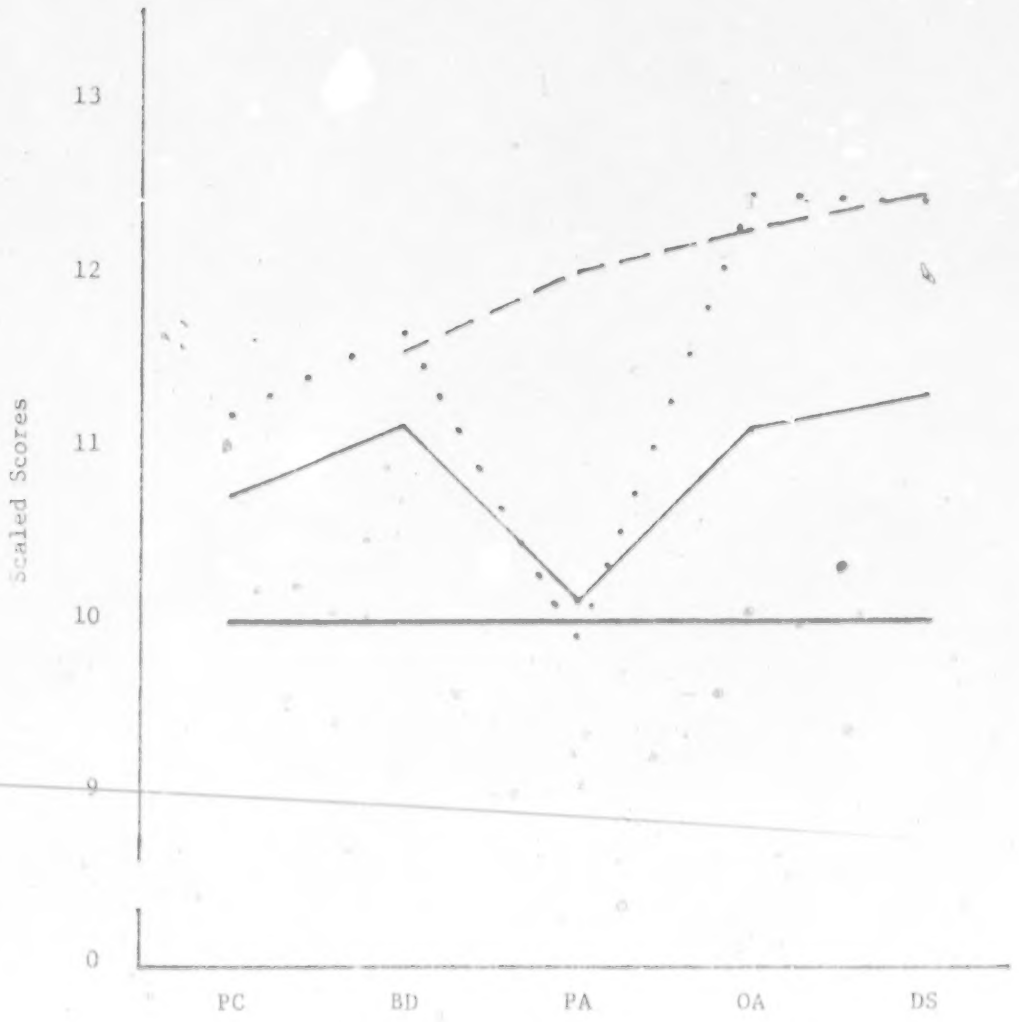
Current Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores for Total, Female and Male Deaf Populations (Compared to Hearing Population Norms)



——— Total Deaf Population (BD, PA, OA, DS - [N=82], PC - [N=54])
— — — Female Deaf Population (BD, PA, OA, DS - [N=39], PC - [N=25])
. . . Male Deaf Population (BD, PA, OA, DS - (N=43], PC - [N=29])
Hearing Population Norms
PC - Picture Completion
BD - Block Design
PA - Picture Arrangement
OA - Object Assemble
DS - Digit Symbol

Figure 31

Current Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores For Delgado, Seattle and TVI Deaf Populations (Compared to Hearing Population Norms)

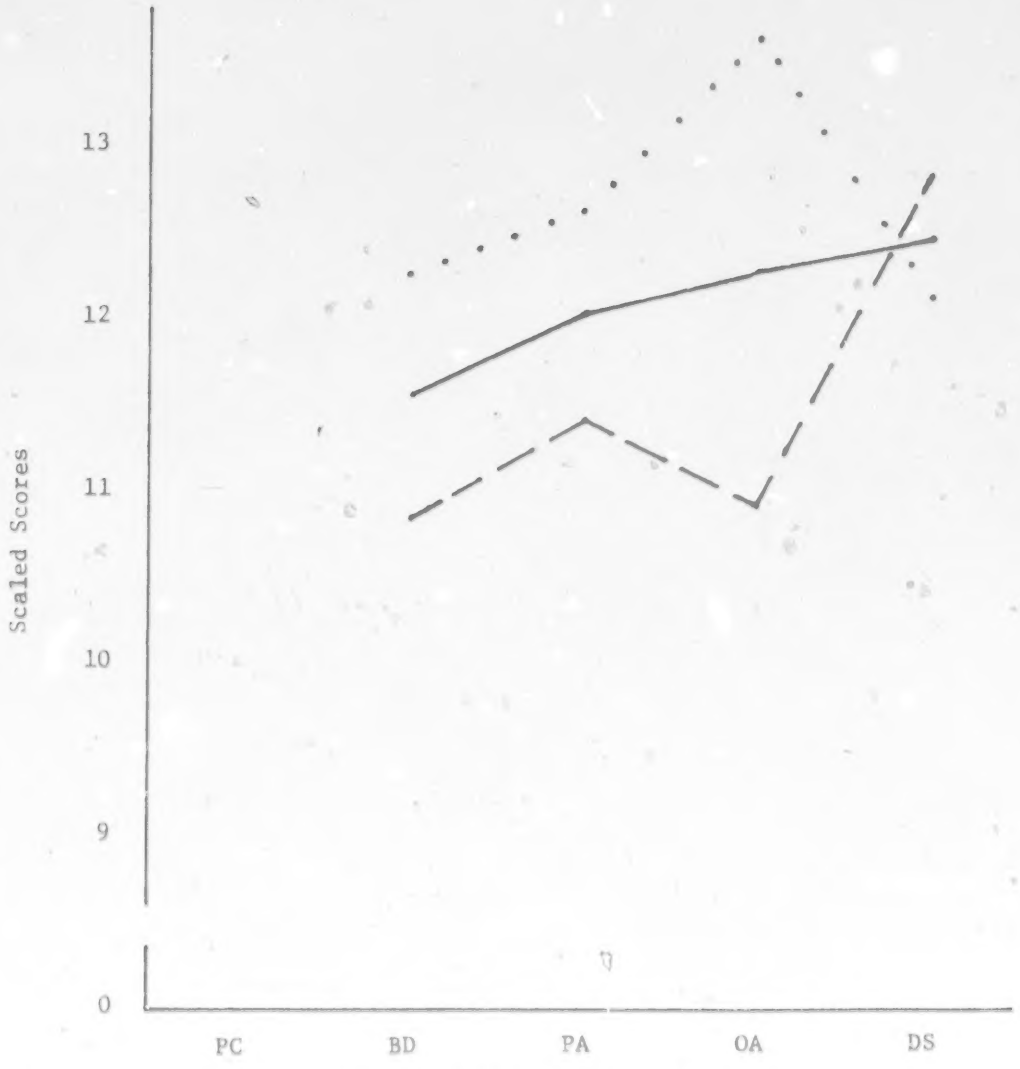


— — Total Delgado Deaf Population (N=28, PC scores are missing)
——— Total Seattle Deaf Population (N=26)
. . . Total TVI Deaf Population (N=28)
═══ Hearing Population Norms

PA - Picture Arrangement
PC - Picture Competion
BD - Block Design
OA - Object Assemble
DS - Digit Symbol

Figure 32

Current Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores for Delgado Total, Female, and Male Deaf Populations

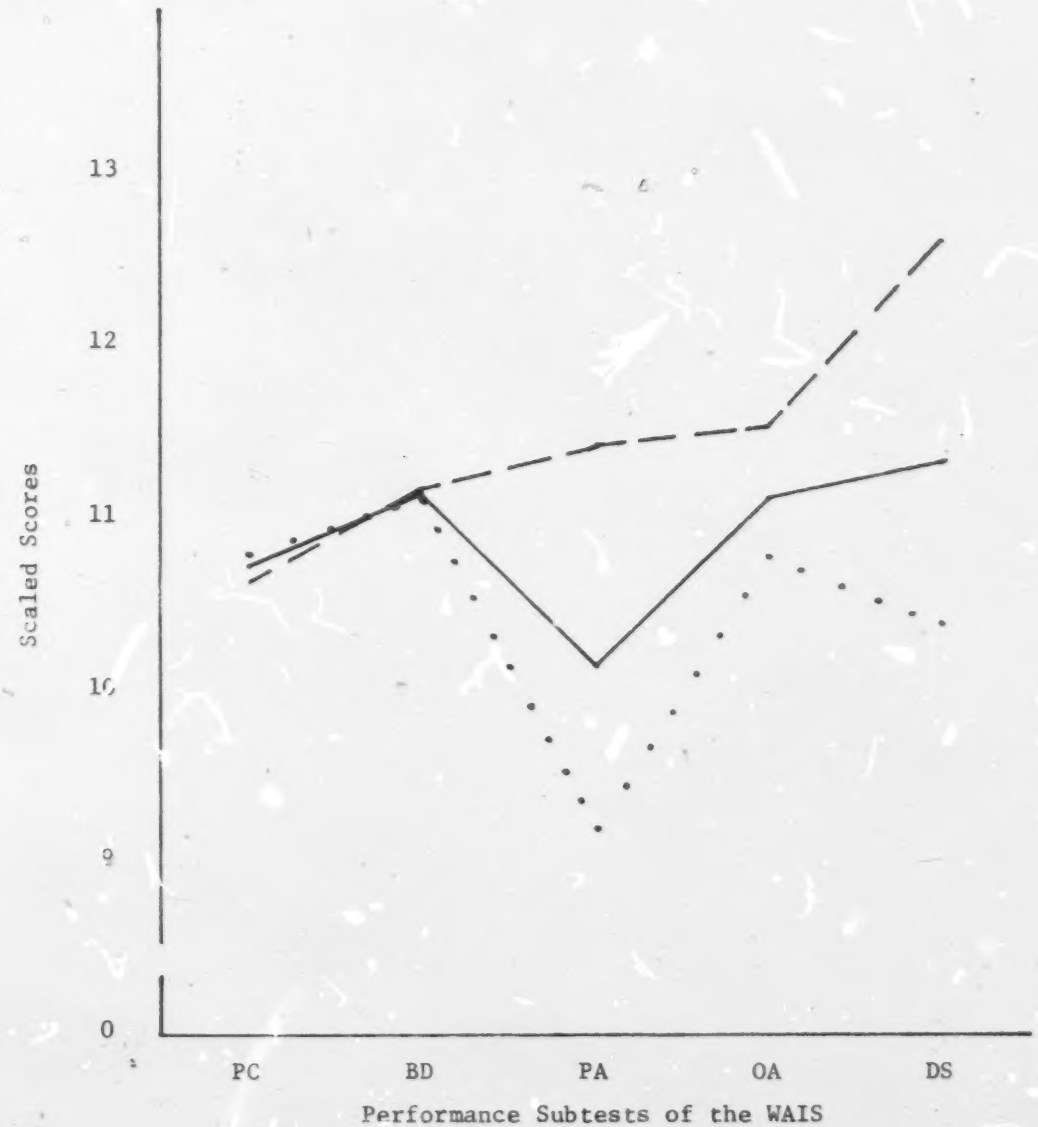


——— Delgado Total Deaf Population (N=28, PC scores are missing)
— — Delgado Female Deaf Population (N=14, PC scores are missing)
. . . Delgado Male Deaf Population (N=14), PC scores are missing)

PC - Picture Completion
BD - Block Design
PA - Picture Arrangement
OA - Object Assemble
DS - Digit Symbol

Figure 33

Current Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores for Seattle Total, Female, and Male Deaf Populations

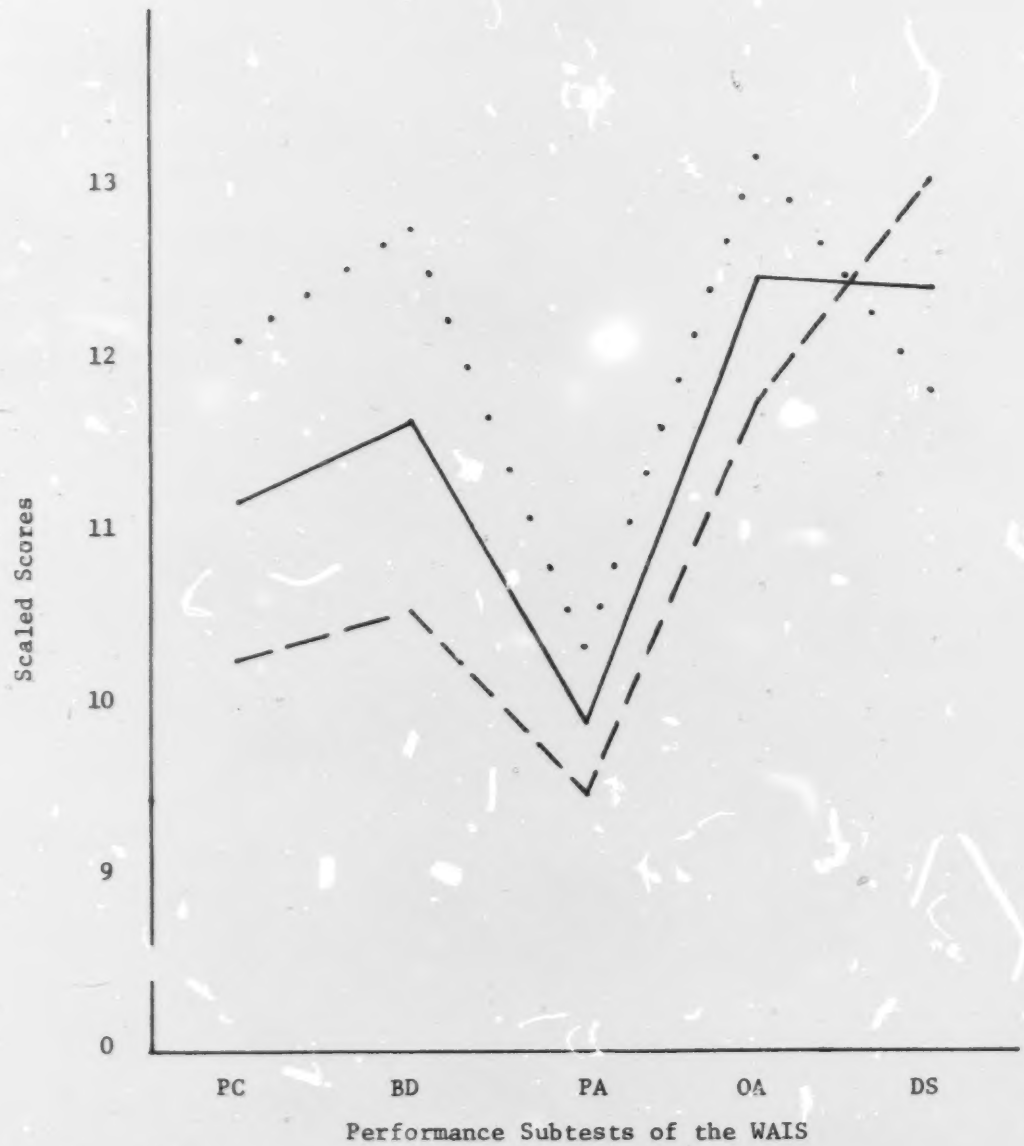


——— Seattle Total Deaf Population (N=26)
— — Seattle Female Deaf Population (N=11)
. . . Seattle Male Deaf Population (N=15)

PC - Picture Completion
BD - Block Design
PA - Picture Arrangement
OA - Object Assemble
DS - Digit Symbol

Figure 34

Current Student Data: Means of the Wechsler Adult Intelligence Performance Scale Subtest Scores for TVI Total, Female and Male Deaf Populations



——— TVI Total Deaf Population (N=28)
— — TVI Female Deaf Population (N=14)
. . . TVI Male Deaf Population (N=14)

PC - Picture Compeltion
BD - Block Design
PA - Picture Arrangement
OA - Object Assemble
DS - Digit Symbol

Table 16

Current Student Data: Means of
WAIS Subtest Scores and Performance IQ's
by School and Sex

SCHOOL	SEX		Wechsler Adult Intelligence Scale					
			PC	BD	PA	OA	DS	PIQ
DELGADO	F	$\bar{X}$	-	10.86	11.43	10.93	12.86	-
		N	-	14	14	14	14	-
	M	$\bar{X}$	-	12.29	12.64	13.64	12.14	-
		N	-	14	14	14	14	-
	TOT	$\bar{X}$	-	11.57	12.04	12.29	12.50	-
		N	-	28	28	28	28	-
SEATTLE	F	$\bar{X}$	10.64	11.18	11.45	11.55	12.64	109.6
		N	11	→	→	→	→	→
	M	$\bar{X}$	10.80	11.13	9.20	10.80	10.40	103.3
		N	15	→	→	→	→	→
	TOT	$\bar{X}$	10.73	11.15	10.15	11.12	11.35	106.0
		N	26	→	→	→	→	→
TVI	F	$\bar{X}$	10.29	10.57	9.50	11.79	13.07	106.9
		N	14	→	→	→	→	→
	M	$\bar{X}$	12.14	12.79	10.36	13.21	11.86	113.1
		N	14	→	→	→	→	→
	TOT	$\bar{X}$	11.21	11.68	9.93	12.5	12.46	110.0
		N	28	→	→	→	→	→
TOTAL	F	$\bar{X}$	10.44	10.85	10.74	11.41	12.87	108.1
		N	25	39	39	39	39	25
	M	$\bar{X}$	11.45	12.05	10.70	12.51	11.44	108.0
		N	29	43	43	43	43	29
	TOT	$\bar{X}$	10.98	11.48	10.72	11.99	12.12	108.1
		N	54	82	82	82	84	54

DISCUSSION

The findings will be discussed following the order of presentation of each measure in the monograph; the Stanford Achievement Test, the General Aptitude Test Battery (GATB) and the Wechsler Adult Intelligence Scale (WAIS). The reader is referred to the respective sections for the tabular and narrative presentations of the data.

The Stanford Achievement Test

Regardless of battery level administered, both current and former student data sets yield a unique deaf adult achievement profile. This profile ranks Spelling and Arithmetic Computation as the first and second academic areas in which deaf adults indicate highest achievements; no reading skill is required on the Spelling subtest, and the Arithmetic Computation test is totally non-verbal. Poorest student performance is manifested on the Word Meaning and Paragraph Meaning subtests, measures which test one's knowledge of vocabulary and literal or inferential comprehension, respectively. The subtests which fall somewhere between the low and high performance continuum are assigned a rank congruent to the verbal complexity of the majority of test items in each academic area. In short, the greater the verbal complexity of the subtest, the higher the assigned rank and the lower the grade equivalent score.

The Intermediate Battery I profile ranks the ten academic areas, in order of increasing difficulty, as follows: (1 and 2)* Spelling and Arithmetic Computation; (3) Social Studies; (4) Arithmetic

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*The difference between the grade equivalent scores of two subtests is extremely small (generally no larger than one-tenth of a point) so that, depending on the sample, either subtest may be assigned either rank.

Concepts; (5) Arithmetic Applications; (6) Language; (7) Science; (8 and 9)* Word Meaning and Paragraph Meaning; and (10) Word Study Skills. The nine subtests of the Intermediate II Battery are ranked as follows: (1) Spelling; (2) Arithmetic Computation; (3) Arithmetic Concepts; (4) Arithmetic Applications; (5) Social Studies; (6) Language; (7 and 8)* Paragraph Meaning and Science; and (9) Word Meaning. The major difference in the ranking of subtests between batteries is the rank of the Social Studies subtest. In Battery I, SS is assigned a rank of 3 and in Battery II a rank of 5. Item analysis and item content description of Stanford Achievement Tests (Annual Survey of Hearing Impaired Children and Youth, 1972) reveal that the Battery I SS consists of 24 content type questions (50%) and 25 study skills questions (50%), whereas the Battery II SS consists of 45 content (67%) and 20 study skills (33%) questions. The Survey also shows that hearing impaired students generally perform better on the Study Skills component of the SS subtest than on the Content component. The study skills component contains questions that measure graph reading ability. Since the Battery I SS subtest consists of a proportionately larger number of study skills type items than the Battery II SS, hearing impaired examinees obtain proportionately higher scores on the former than the latter. It is not surprising, therefore, that the Social Studies subtest ranks third relative to other subtests of Intermediate Battery I, while it ranks fifth relative to Battery II subtests. This ranking supports the theory that the verbal complexity of the academic area and/or the test items affects student performance.

Among the students examined in this study, females outperformed males in the Spelling and Language subtests of the Stanford Achievement Test, regardless of battery level administered. The males of the former student sample outperformed the females in the Arithmetic Computation subtest of the Intermediate Battery II, a difference similarly found between the scores of male and female hearing students (Annual Survey of Hearing Impaired Youth, Series D, #13, 1972). The majority of deaf adults in this study attended residential schools for the deaf, institutions which appear to emphasize pre-vocational training. An investigation conducted by Lunde and Bigman (1959) indicates that, at the secondary level males acquire training in areas such as printing and carpentry, while females acquire training in clerical work and domestic science. The traditional vocational areas for deaf men give them an opportunity to put their mathematics knowledge to use, whereas the traditional vocational areas for deaf women require daily application of spelling and English Language (mostly punctuation) skills. In view of this information and the empirical findings of this study, it can be inferred that level of achievement is a function of frequency of application and not a function of female or male innate capabilities.

Few differences were found between schools across subtest measures on the Intermediate Battery II. On the Intermediate Battery I, however, the Delgado sample scored significantly lower than the Seattle sample on every subtest, except Arithmetic Com-

putation and Spelling (non-verbal measures). Given no intellectual (WAIS) differences, it is interesting that a greater proportion of those with lower proficiency in the English language are accepted by the Delgado program than by the Seattle or TVI programs.

General Aptitude Test Battery and Non-Reading Measure of General Intelligence

Both current and former student data sets yield identical and unique deaf adult aptitude profiles. These profiles rank nine aptitudes, in order of decreasing ability, as follows:

(1) Aptitude P - Form Perception
(2) Aptitude Q - Clerical Perception
(3) Aptitude S - Spatial Aptitude
(4) Aptitude K - Motor Coordination
(5) Aptitude F - Finger Dexterity
(6) Aptitude M - Manual Dexterity
(7) Aptitude N - Numerical Ability
(8) Aptitude G - Intelligence
(9) Aptitude V - Verbal Ability

It is interesting to note that the rank ordering of aptitudes places them in clusters so that perceptual-spatial abilities (Aptitudes P, Q, S) are the highest aptitudes, followed by manual abilities (Aptitudes K, F, M), followed by aptitudes measuring English Language ability (N, G, V). It was to be expected that aptitude measures which have a strong verbal loading would yield the lowest scores, and that those with the least verbal content would yield the

highest scores. The Boatner, Stuckless and Moores (1964) study reported that the deaf were significantly inferior to the general adult population on aptitudes G, V, N, and Q and significantly superior on aptitudes P and M. Similarly, the deaf population in this study was inferior to the hearing population on Aptitudes G, V, and N and showed superiority on Aptitude P (all variable differences significant, $p < .001$). Contrary to the 1964 study, however, the deaf were also found to be significantly superior to the hearing on aptitudes S, K and Q. The significance of the differences in the results of these two studies is unclear and interpretation must be made with caution. However, it is the author's opinion that the data of the current study look much more logical assuming that deaf individuals rely more heavily on the visual mode for stimulus input than do most hearing people. Regardless of interstudy differences, these GATB results are in strong opposition to the position of Myklebust that deafness has an overall depressing effect on functioning (The Psychology of Deafness, 1964).

The Nonreading measure of general intelligence mean is 17 points higher than Aptitude G in the former student sample and 19 points higher in the current student sample, bringing the intelligence score of the deaf population just above the mean of the hearing population.

In both former and current student samples, mean differences between males and females were found on Aptitudes S, P, Q, K and F, differences similarly found between the aptitudes of male and female hearing populations (GATB Manual, 1970). Males show higher aptitude

in spatial ability (Aptitude S) and less aptitude in perceptual and manual abilities (Aptitudes P, Q, K, and F) than females. Aptitude S measures "the ability to recognize the relationships resulting from the movement of objects in space," an ability possibly developed from experience in a vocational area such as drafting, carpentry and printing. Abilities measured by Aptitudes P, Q, K and F (See Section A, Test Description of the GATB) are possibly facilitated by frequent typing and keypunching types of experience.

Wechsler Adult Intelligence Scale - Performance

The Performance IQ means of both former and current student samples indicate that the deaf adult population under study is average in intelligence (the deaf population mean is within one standard deviation [SD=15] above the hearing population mean of 100). The deaf population performs relatively better on subtests which measure association, perceptual and visual-motor skills, as in the Digit Symbol, Block Design and Object Assembly subtests, than on tests which require verbal skills for task completion, as in the Picture Arrangement and Picture Completion subtests (see Section A, Test Description of the WAIS). These results are consistent with aptitude and achievement findings.

Females of both current and former student data sets outperformed males on the Digit Symbol subtest of the Performance Scale, a speed and accuracy test requiring that the examinee associate certain symbols with other symbols. This task is similar to that involved in typing or keypunching, vocations in which deaf females

have been traditionally trained. Deaf males of both current and former student data sets outperformed females on the Picture Completion subtest of the WAIS, a measure requiring that the examinee discover and label the missing part of each of 21 incompletely drawn pictures. The performance of males on this task may be facilitated by their consistent educational experience in constructing items out of smaller parts where a focus on detail is necessary for adequate task completion. In the former student sample, the males additionally showed superior performance to females on the block design measure, a task analogous to building an object from a blueprint or vice versa, as in construction work, drafting, printing, etc.

For the former student sample (See Figure 26), differences found between schools across subtest measures DS, BD, PA and OA indicate that the Delgado sample means are depressed relative to the Seattle or TVI means. These significant differences are possibly due to the examiner's method of test administration. As noted earlier (Section C, Methods and Procedures), the examiner did not employ Sign Language, which is used by a majority of the deaf adult population. Examinee misunderstanding of test instructions is a probable explanation for the significantly poorer performance of this sample across test measures.

EDUCATIONAL IMPLICATIONS

What is learned by deaf individuals prior to post secondary education is what has been effectively taught to them at the elementary and secondary level. In terms of academic achievement it is obvious, from this study and others, that most deaf people achieve at levels far below what might be expected on the basis of their intellectual abilities. In addition, the more a particular area is related to facility in the English language the greater is the gap between potential and performance for the typical deaf students.

Analysis of scores on the Stanford, GATB and WAIS leads to some inescapable conclusions. The primary one is that as a group deaf adults are the intellectual equals of hearing adults and may be somewhat superior in areas demanding spatial and perceptual skills. Therefore, there is no reason to believe that deaf individuals should have any more difficulty than anyone else in meeting the cognitive demands of any profession. The high ratings which supervisors of deaf employees (Monograph II) and regular classroom teachers (Monograph III) give deaf workers and students tends to support such a position.

Problems arise not because of the cognitive demands of a job but because of difficulties in communication and, especially, insufficient command of the English language. There is even reason to believe that, because deaf people are underemployed, a deaf person is more often than not the intellectual superior of hearing people employed in the same type of work.

It is unreasonable to expect vocational technical programs to provide deaf students the English language skills they have not acquired in 12 years or more of prior schooling. Although "remedial" English and Math programs may be helpful, the major emphasis legitimately is on acquisition of job-related skills.

However, the enormity of the problem cannot be ignored. Deaf individuals form an economically disadvantaged group. No matter how effectively post secondary programs function, the disadvantage cannot be eradicated completely until preschool, elementary and secondary programs for the deaf begin to provide their students with the means of effective communication. That time is not yet in sight. Until it arrives, the typical deaf worker will be a person of normal intellectual ability employed in a position beneath his ability and hampered by problems of communication with fellow workers.

ADDITIONAL RESEARCH NEEDED

1. Revision of test materials so that verbally loaded items are substituted by comparable non-verbal items which measure the same aptitude, achievement, and intelligence factors.

2. The development of standarized procedures for administering the Stanford Achievement Test, The General Aptitude Test Battery and The Wechsler Adult Intelligence Scale to deaf individuals.

3. Development of curriculum materials and teaching methods which take full advantage of deaf individuals' strengths rather than weaknesses as indicated by achievement, aptitude and intelligence profiles herein.

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APPENDIX A

TEST DATA

STUDENT NAME _____ PROGRAM ENTRY DATE _____

	G	V	N	S	P	Q	K	F	M
GATB									
+1SEm									

Date tested _____
Tester _____

IPAT Culture Fair Scale 2 Form A [ ] Date tested _____
Tester _____

SAT INTERM. BAT. II	WM	PM	S	L	AC1	AC2	AA	SS	SC

Form _____
Date tested _____
Tester _____

WAIS Perform.	DS	PC	ED	PA	OA	TOT	PIQ

Date tested _____
Tester _____

Comments _____

_____

_____

MOORES CLOZE TEST

	Grade 4	Grade 6	Grade 8	Total
Verbatim Reproduction	%	%	%	%
Form Class Reproduction	%	%	%	%
Verbatim Given Form-Class				

Date tested _____
Tester _____ Scorer _____

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